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VELOPMENT OF CRITERIA TO DESIGNATE ROUTES FOR TRANSPORTING HAZARDOUS MATERIALS

September 1980
Final Report

DEPARTMENT OF TRANSPORTATION • UNITED STATES OF AMERICA •

Prepared for
FEDERAL HIGHWAY ADMINISTRATION
Offices of Research & Development
Traffic Systems Division
Washington, D.C. 20590

FOREWORD

This report documents the results of an investigation of hazardous materials transport and the development of criteria and a methodology to designate highway routes for hazardous materials movements. This report should be of primary interest to traffic safety researchers and engineers.

The research was conducted as part of FCP Project 1A, Traffic Engineering Improvements for Safety, as a result of problem statements from the Federal Highway Administration's Office of Highway Safety and Bureau of Motor Carrier Safety.

Two copies of this report are being sent to each regional office and four copies to each division. Two of the division copies should be sent to each State highway agency.

Charles F. Scheffey

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Director, Office of Research

NOTICE

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16. Abstract

The purpose of this report is to document the results of an investigation of hazardous materials transport by truck and to develop criteria to designate routes for hazardous materials movements. Section 1 introduces, reviews, and summarizes the hazardous materials (HM) routing problem. Section 2 documents the steps taken--from the development of route selection factors to the selection of models used--to predict the probability of an HM accident. The documentation consists of: an examination of federal, state, and a limited number of local laws and regulations; an indication of which factors should be considered for route selection; and the development of a procedure to determine the probability of an HM accident on routes considered for the transport of HM. Section 3 develops a methodology which can be used to assess the consequences of an HM accident; primary factors considered are population and property exposure. Section 4 combines the results of Sections 2 and 3 into a risk assessment methodology which quantitatively indicates routes having more or less risk associated with the transport of HM; criteria are also presented for designating HM routes. Section 5 presents the results of applying the HM risk methodology in two jurisdictions and assesses the utility of the methodology. The findings and techniques presented in this report are also presented in a shorter, user-oriented implementation guide entitled, "Guidelines for Applying Criteria to Designate Routes for Transporting Hazardous Materials" (USDOT FHWA Implementation Package FHWA IP 80-20).

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We would also like to acknowledge the advice and direction of Doug Robertson, our contract manager, and Stan Byington, Traffic Systems Division, FHWA. Another important contributor to this project was our subcontractor, The Institute for Safety Analysis (TISA).

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1. INTRODUCTION TO DETERMINING CRITERIA FOR THE ROUTING OF HAZARDOUS MATERIALS

BACKGROUND

Several forces and influences have recently combined to increase public awareness of hazardous materials transportation. A hazardous material is defined in the Hazardous Materials Transportation Act (HMTA) of 1974 as "a substance or material in a quantity and form which may pose an unreasonable risk to health and safety or property." This definition covers such substances as explosives, radioactive materials, liquified petroleum gas (LPG), liquified natural gas (LNG), poisons, etiologic agents, and liquid and solid flammables. Growing concern about the human and environmental consequences of unintentional releases of these materials has led to greater government and private interest in this problem.

This mounting governmental, industrial, and private concern about hazardous shipments over the highways is due to several factors which make this issue highly visible: an above average number of serious accidents in recent years; widespread questions regarding our technical abilities to control these problems (particularly oil spills and poisonous gas releases); and increased public awareness of the magnitude of the potential problem.

Several Federal agencies are directly involved in hazardous materials regulation. The U.S. Department of Transportation (DOT) administers regulations through its multi-modal administrations and recently issued a task force report on hazardous materials transportation (1).* During the spring of 1979, the Senate Committee on Commerce, Science, and Transportation issued a review and analysis of the DOT hazardous materials regulatory program (2). Both the U.S. Environmental Protection Agency (EPA) and Department of Energy (DOE) are also involved with hazardous shipments in the areas of nuclear energy transport and hazardous waste disposal.

Industry maintains an active interest in this field, through organizations such as the American Trucking Association, Inc. (ATA), and contributes to the growing national debate over these sensitive policy issues. The American Automobile Association Foundation for Traffic Safety, for instance, recently published a pamphlet recommending procedures and responses for motorists encountering hazardous materials accidents (3).

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*Numbers in parentheses indicate references to be found at the end of the section.

DOT has responded to many of these problems under the authority granted in the 1974 HMTA. Extensive regulations now cover virtually all aspects of packaging, handling, and labeling of hazardous materials during transport. One area that has not been carefully regulated is carrier route selection. A few general route criteria have been established, as indicated in Section 397.9 of Title 49 of the Code of Federal Regulations and by the Bureau of Motor Carrier Safety, but no comprehensive authoritative rules currently govern the designation of a shipment's path. A Federal Highway Administration (FHWA) request for proposals (RFP), entitled "Development of Criteria to Designate Routes for Transporting Hazardous Materials," was issued to address this particular question. This document is the final report completed in response to the contract awarded for the above RFP.

The FHWA is anxious to develop a uniform policy for hazardous materials route designation. A limited number of these substances represent such serious health hazards that they should probably be treated on a case-by-case basis. On the other hand, many of the risks associated with transporting other less dangerous materials can be substantially reduced by thoughtful routing. For example, highly vulnerable population centers or environmentally sensitive areas can be avoided or their potential exposure minimized. A route planner who properly understands the potential consequences of releases of the different materials will be able to: differentiate between materials that can and cannot be contained; identify materials that have localized impacts or threaten property more than life; and make other essential decisions. Only with such knowledge can planners develop criteria to inflict minimum cost on the carrier while providing maximum protection for the public.

Although DOT has been authorized to govern hazardous materials routing practices, it has not yet issued definitive regulations. Both State and local governments appear to be waiting for federal initiatives in this area because any federal policies adopted will likely preempt local ordinances. A few State and local governments have controlled the movements of certain classes of materials (e.g., explosives in California and certain nuclear materials in New York City), but hazardous materials shipments remain largely unregulated with respect to route. Bridge, tunnel, and turnpike authorities have adopted the most restrictive rules and in several locations prohibit any explosives, flammables, or corrosives on their structures.

The study approach deals with these issues at a national level. One of the concerns expressed by local and State governments and shippers was the need for the application of consistent regulations in all regions of the country. The potential problem posed by locally mandated routing practices could be enormous for a shipper trying to comply with such ordinances. On the other hand, it is equally unrealistic to expect the Federal Government to designate specific routes for local communities. The logical solution, which this study

proposes to develop, is a generalized set of planning criteria that can be used by State and local governments but requires interregional consistency.

PROJECT SCOPE

The purpose of this project is to develop planning criteria and techniques for assessing the relative risks of different routing alternatives for different classes of hazardous materials.

The study addresses hazardous materials shipments that require placarding. This stems from DOT requirements for placarding that apply to certain types or quantities of hazardous materials.

One of the fundamental study objectives is to develop a risk assignment technique for evaluating alternative routes. In this study, risk is defined as the multiplicative product of the probability of an accident occurring and the consequences of that accident if it does occur:

$$\text{Risk} = \text{Probability}(A) \times \text{Consequences}(A)$$

Thus, procedures that either diminish the likelihood of an accident occurring or minimize its consequences also diminish risk. This schema involves two major areas of investigation: (1) determine what makes some roadways more or less accident prone than others; and (2) identify populations and environments whose characteristics and proximity to roadways make them particularly sensitive to hazardous material releases.

To meet the dual requirements of national uniformity and local implementation, the project team developed routing procedures that can be applied at all government levels as well as by the carrier. Factors that have been identified as potential risk increasers or decreasers are quantified at the national level to the extent possible. However, the planning methodology is structured to allow local planners to substitute their parameters if local data exist or use informed judgment to better tailor the product to local needs. Roadway and traffic factors that affect accident probabilities are based on national data, but these values are designed to be default parameters for communities lacking superior local information. For example, a community may already know which roads have higher accident rates. With this knowledge, the planner is better equipped to determine which roadways should be avoided than if he were to rely on nationally derived accident rates for similar road types.

The other component of risk, potential consequences, is estimated in a similar fashion. A community with specialized response capabilities or unusual climatic conditions may wish to substitute its estimates of potential consequences for the nationally generated values. For example, coastal communities with prevalent off-shore breezes may assign less weight to the threat of concentrated poison gas dispersion than areas with atmospheric inversions or prevailing wind patterns that would endanger downwind populations.

STUDY PRODUCT

The product of this study may be best understood by examining a hypothetical example. Figure 1 represents a small city in the midwest that will serve as a structural basis for this discussion. To facilitate the discussion, it is assumed that no local ordinances affect hazardous materials routing in this city. As illustrated, the city uses three hazardous materials: gasoline in the filling stations, chlorine at the water works, and anhydrous ammonia for fertilizer is sold at the grain elevator. In addition, an unknown number of hazardous materials pass through the city. It is assumed that each of the commodities used within the city originates east of the city on I-70. The other hazardous commodities have origins equally divided between east and west of town. From this description, two routing problems are evident: the local distribution of hazardous materials and the transport of hazardous materials through the city.

The shortest distance route for each of the locally distributed commodities is simply I-70 to Main Street and then to the respective destinations within the city. However, this route exposes the city's highest value property to the hazardous materials. On the other hand, this route may have one of the lower probabilities of accidents since it is short and intersections (i.e., exposure) with other traffic are minimized. An alternative route with less potential consequence for the chlorine and fertilizer would be I-70 to E Avenue, E Avenue to the rural road, the rural road to G Avenue, and then to each of the destinations. This route minimizes consequences but, while it decreases accident potential because fewer intersections are encountered, it may increase accident potential because the interstate has a greater exposure factor (i.e., volume). Other routes and factors can also be examined, but without quantified values it is impossible to determine which of the alternative routes has the least risk.

The through transport of hazardous materials is somewhat different. Both US 40 and I-70 are viable routes, with I-70 seemingly the quickest and safest. However, many cities find that hazardous materials are carried on routes such as US 40 because of established habits of drivers, eating locations, or other less well-defined reasons. To determine the magnitude of the risk differential between the two routes, it is necessary to quantify the components of risk associated with the transport of hazardous materials on each route.

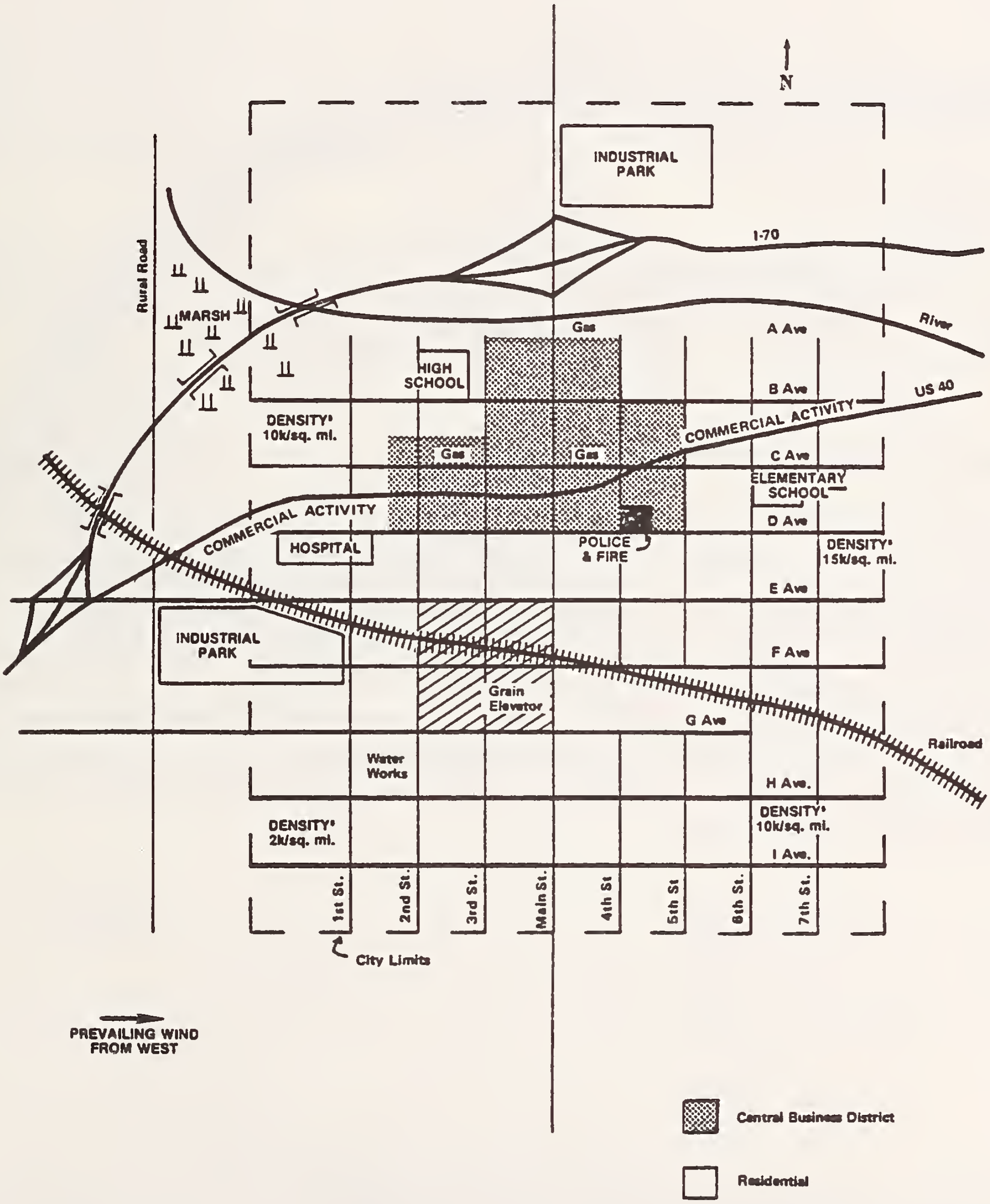

FIGURE 1: REPRESENTATION OF A SMALL CITY

This document provides the background needed by the planner or engineer to determine the least risk route for transporting hazardous materials, for both local distribution and through carriage. Figure 2 describes conceptually the area of influence of the hazardous materials distributed locally, and Figure 3 presents the area of influence for the hazardous materials carried through the city. In both cases, the shaded areas represent the potential impact of a hazardous materials accident at any point along the route. Later sections of this report will indicate how to quantify these consequences as well as determine the probability of this type of accident occurring anywhere along the route. Multiplying the probability of a hazardous materials accidents times the consequences of the accident produces a risk value. This risk value can be computed for each route. Routes having the least risk can then be identified.

This illustrative example has been kept simple for purposes of explanation. The sections that follow present the background, development, and methodology used to develop criteria for designating routes for the transport of hazardous materials.

ORGANIZATION OF THE REPORT

Section 2 of this report documents the steps taken from the development of route selection factors to the selection of models used to estimate the probability of a hazardaus materials accident. Section 3 develops a consequences methodology which can be used to assess the consequences of hazardous materials accidents. Section 4 combines the results of Sections 2 and 3 into a risk assessment methodology, which can be used to indicate quantitatively the risk associated with the transport of hazardous materials over a pre-defined route. Section 5 presents the results of applying the hazardous materials risk methodology in two jurisdictions and assesses the utility of the methodology.

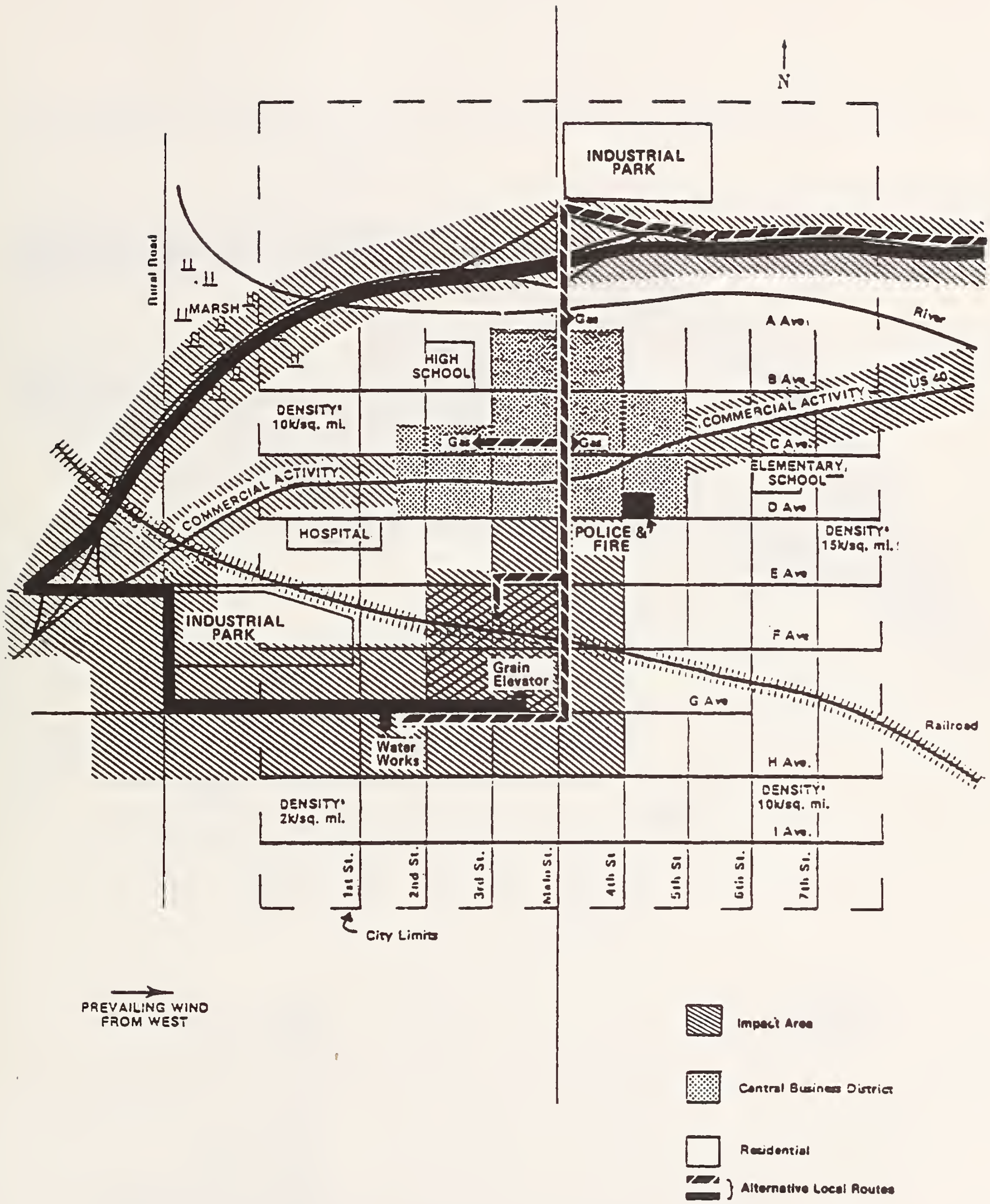

FIGURE 2: POTENTIAL CONSEQUENCES OF HAZARDOUS MATERIALS ACCIDENTS FOR LOCALLY DISTRIBUTED COMMODITIES

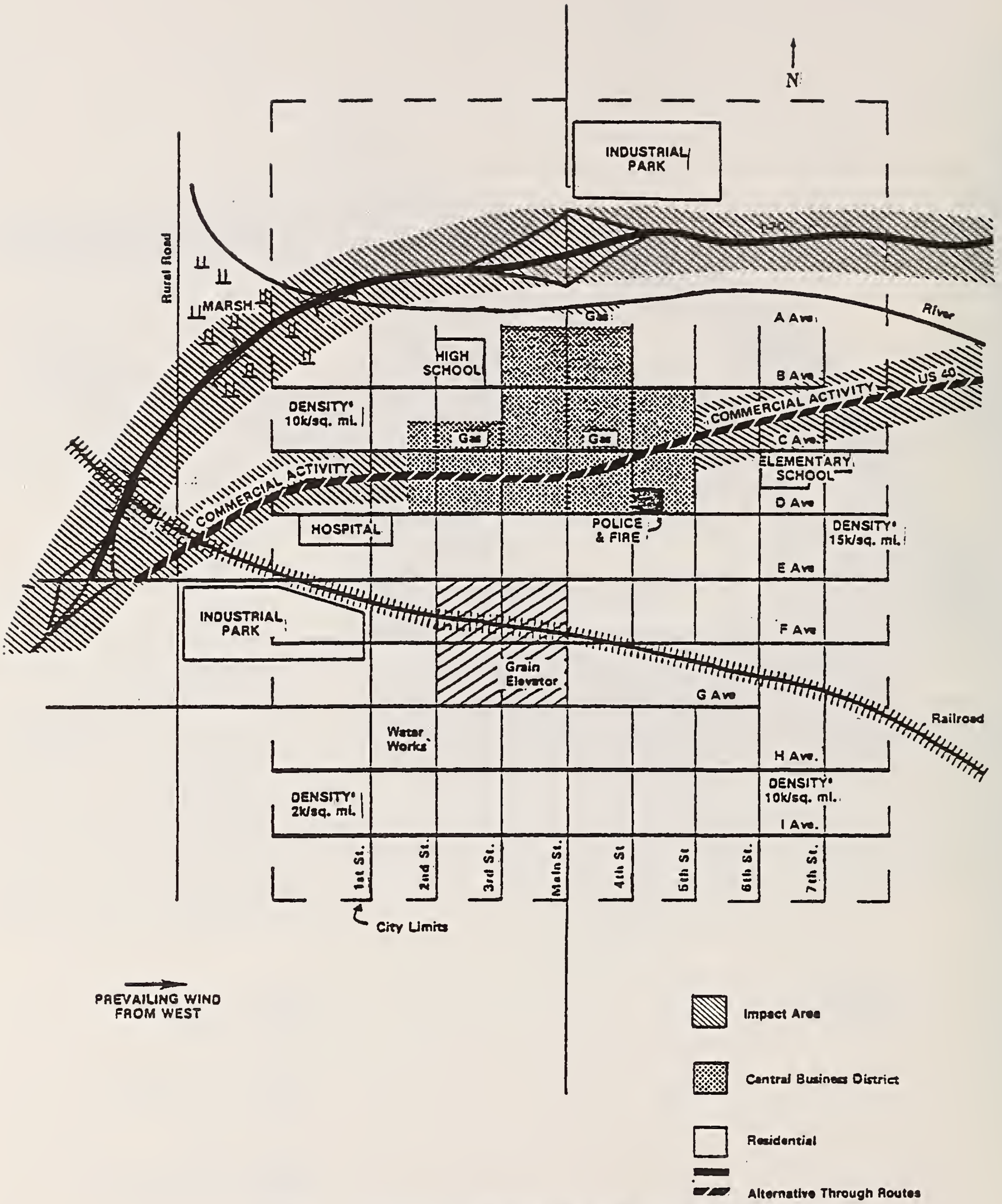

FIGURE 3: POTENTIAL CONSEQUENCES OF HAZARDOUS MATERIALS ACCIDENTS FOR THE TRANSPORT OF HAZARDOUS MATERIALS THROUGH THE CITY

REFERENCES

1. U.S. Department of Transportation, Report of the Hazardous Materials Transportation Task Force, Washington, D.C., September 1978.

2. Congresional Research Service of the Library of Concress, Hazardous Materials Transportation: A Review and Analysis of the Department of Transportation Regulatory Program, Committee on Commerce, Science, and Transportation, U.S. Senate, Washington, D.C., April 1979.

3. AAA Foundation for Traffic Safety, Highway Transportation of Hazardous Materials: Safety Implications for All Motorists, 8111 Gatehouse Road, Falls Church, Virginia, 1979.

2. FACTORS CONSIDERED FOR HAZARDOUS MATERIALS ROUTE SELECTION

INTRODUCTION

For purposes of this discussion, the broad range of factors which may influence the choice of routes for a hazardous materials movement are divided into two groups: mandatory factors and variable factors.

There are two types of mandatory factors: (1) physical restrictions, and (2) legal and regulatory restrictions. Examples of physical restrictions are bridge and tunnel, and height and weight restrictions. In the development of route selection criteria, physical restrictions are essentially given conditions that must be complied with and incorporated into the overall route selection process. Legal and regulatory restrictions expressly prohibit or regulate the transport of one or more of the classes of hazardous materials. Although legal restrictions are mandatory factors, they need not be treated as hard and fast restrictions. Rather, they are acknowledged, and the analysis is conducted to make sure they are still appropriate. For example, the characteristics of a route prohibited from use in the past might be changed by subsequent events making the route a potentially viable one for hazardous materials transport. The analyst may wish to perform the risk analysis for routes with legal restrictions in order to compare them with the alternatives. If the route with the restriction is also the route with the least risk, the community may wish to re-examine the restriction from a broader perspective.

Variable factors are items that affect the route selection decision but do not necessarily preclude the use of a route. They are typically influences that must be qualified for specific situations. For example, high levels of traffic density result in higher accident rates during those periods of increased activity. Thus, traffic density may become an important criterion on certain routes during peak hours but may not be an issue during off-peak hours. Traffic density is a variable factor because its relevance is a function of conditions at a particular place or point in time. Likewise, population density becomes a variable factor with respect to different classes of hazardous materials because different materials present varying levels of hazard.

Substances--even in small quantities--that pose serious health threats may have different routing requirements than substances with fairly localized impacts if discharged. Ideally, route selection should strive to find the combination of accident probabilities and potential consequences that produces the lowest risk. In order to estimate risk, however, it must first be known how road and traffic conditions affect accident probabilities and, subsequently, how human and environmental conditions can be assigned different consequence values.

This section examines the two classes of factors--mandatory and variable--and documents the process for selecting the most important variable factors. (By definition, mandatory variables are usually a given in the criteria selection.) Within the variable factor list, roadway characteristics which contribute the most to the likelihood of an accident are identified and, in turn, predictive models which use these important factors are presented. The factors that influence route selection most strongly from a consequences perspective are discussed in detail in Section 3.

EXAMINATION OF ROUTE SELECTION FACTORS

Physical Mandatory Factors

The physical characteristics of the roadway and roadway structures are obvious factors in route selection. Clearance heights on overpasses and weight limits on bridges are quantifiable factors that will either permit or prohibit hazardous material carriers.

Legal Mandatory Factors

A legal search was conducted to identify mandatory routing factors at the Federal, State, and local levels. Although hazardous materials routing restrictions are not widely used, they exist on numerous bridges, tunnels, and privately owned facilities. For example, California has designated certain routes as stopping places for trucks carrying explosives. Drivers must comply with these directives and may only stop at designated places. Some communities, such as Dallas, Texas, and Washington, D.C., have enacted hazardous materials routing ordinances to prohibit trucks carrying hazardous materials from using certain roadways. The following discussion reviews the current status of legal restrictions on hazardous materials movements.

Federal Laws

Federal statutes concerning hazardous materials shipment by highway have existed since 1908 under the administration of the Interstate Commerce Commission (ICC). The Transportation of Explosives Act made it unlawful for a common carrier to transport explosives by land, except as provided for by ICC safety regulations. Subsequently, this law (35 Stat 554) was amended to include other hazardous materials and to extend its coverage to shippers, contract carriers, and private carriers.

In 1967, the ICC's safety regulation function was transferred to the newly created Department of Transportation (DOT). The Department of Transportation Act (Public Law 89-670) directed the Federal Highway Administration (FHWA) to carry out motor carrier safety functions. In order to coordinate

hazardous materials regulations applicable to the various modes of transportation, the Secretary of Transportation created the Hazardous Materials Regulations Board.

The most significant and recent legislation in this area is the Hazardous Materials Transportation Act (HMTA), Title I of Public Law 93-633, effective January 1, 1975. It delegates broad authority to the Secretary of Transportation but requires that the Secretary consult with the ICC before issuing any regulation concerning the routing of hazardous materials carriers. Section 112 of the HMTA expressly preempts "any requirement of a State or political subdivision thereof which is inconsistent with any requirement" of the HMTA or regulations issued under its authority. It is significant that the law also authorizes the Secretary to waive the preemption if the state requirements provide an appropriate level of safety and do not unreasonably burden interstate commerce.

In 1975, the Secretary of Transportation created the Materials Transportation Bureau (MTB), made it the lead agency to DOT's hazardous materials safety program, and dissolved the Hazardous Materials Regulations Board. The MTB has the authority to issue all hazardous materials regulations for DOT although it receives input from modal administrations such as FHWA and the Federal Aviation Administration (1).

Federal Regulations

In 1971, a DOT routing regulation was issued under statutes that predate HMTA. The regulation, Section 397.9 of Title 49 of the Code of Federal Regulations,* applicable to interstate motor carriers states the following:

397.9 Routes**

(a) Unless there is no practicable alternative, a motor vehicle which contains hazardous materials must be operated over routes which do not go through or near heavily populated areas, places where crowds are assembled, tunnels, narrow streets, or alleys. Operating convenience is not a basis for determining whether it is practicable to operate a motor vehicle in accordance with this paragraph.

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* Hereafter referred to as 49 CFR 397.9.

**Applicable to hazardous materials carried in quantities such that they are governed by placarding laws of 49 CFR 177.823.

(b) Before a motor carrier requires or permits a motor vehicle containing Class A or Class B explosives to be operated, he must prepare a written plan of a route that complies with the rules of paragraph (a) of this section and must furnish a copy of the written plan to the driver. However, the driver may prepare the written plan as agent for the motor carrier when the driver begins his trip at a location other than the carrier's terminal.

Since 49 CFR 397.9 was not issued pursuant to HMTA, that law's express preemption provision does not apply to this routing regulation.

A second regulation, reissued under HMTA in 1976, approves certain hazardous materials restrictions imposed by states or localities on the use of tunnels (49 CFR 177.810). That section states:

> 177.810 Vehicular Tunnels
>
> Nothing contained in parts 170-189 of this subchapter shall be so construed as to nullify or supersede regulations established and published under authority of State statute or municipal ordinance regarding the kind, character, or quantity of hazardous material permitted by such regulations to be transported through any urban vehicular tunnel used for mass transportation.

Except for these very general regulations, routing of hazardous materials carriers has largely been left to States and localities. This philosophy is reflected in another Federal motor carrier safety regulation (49 CFR 397.3) issued in 1971:

> Every motor vehicle containing hazardous materials must be driven and parked in compliance with the laws, ordinances, and regulations of the jurisdiction in which it is operated, unless they are at a variance with specific regulations of the Department of Transportation which are applicable to the operation of that vehicle and which impose a more stringent obligation or restraint.

Since HMTA was enacted in 1975, MTB has not promulgated any new routing regulations. On August 17, 1978, MTB announced it was considering a national routing regulation for truck transport of radioactive materials (2). On January 31, 1980, the MTB published its "Proposed Rulemaking for Highway Routing of Radioactive Materials" (3). These MTB activities were largely due to an ordinance passed by New York City in 1976, which had the effect of banning most commercial shipments of radioactive materials in or through the City. The "Notice of Advanced Rulemaking," published in 1978, resulted

in considerable comment from public and private agencies concerned about Federal involvement in establishing highway routing requirements for radioactive materials. Some of the persons responding were concerned that the Federal Government should not encroach on State responsibilities. Others, including people from all the cities commenting, stressed that they do not want hazardous materials transported through their communities. Motor carriers, claiming that they are now hampered by inconsistencies from State to State, generally favored a national rule.

The recently published Proposed Rulemaking states that shipments of radioactive materials for which placarding is required must be routed to the extent possible, on circumferential interstates around population centers. Packages of radioactive materials that do not require placarding comprise the majority of all shipments and would be exempt from this requirement. (These materials pose relatively little threat to population or they emit low radiation doses at or near the package surface.) Under the Proposed Rulemaking, carriers would be required to submit a written routing plan, and their movements would be confined to "preferred" highways* unless they needed fuel, repairs, food, lodging, or other necessary steps as defined in the Proposed Rulemaking.

The Nuclear Regulatory Commission (NRC) also has the authority to regulate radioactive materials movements in both its regulatory and licensing proceedings. On June 15, 1979, the NRC issued an amendment to 10 CFR 73, which is designed to reduce the risk of sabotage from nuclear reactors to shipments of spent radioactive fuel transported through heavily populated areas. The rule was issued in effective form, and public comments were solicited for possible revision after its implementation. The rule requires power plant operators to submit to NRC for approval, the route(s) carriers will use to haul the spent fuel for disposal.

At the time of the rulemaking, NRC also provided the power plants with guidance on how to designate the routes. Carriers must stay at least 3 miles (4.8 km) away from about 150 cities identified by NRC. If this is impossible, other safeguards must be taken, including armed private guards or police escorts. The rule is an interim one and may be modified, finalized, or rescinded pending the results of ongoing research in the field. NRC has received numerous public comments on this rule and is currently analyzing them to determine if changes to existing requirements are warranted (4).

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*Preferred highways may be designated by States, but the State must use the same criteria of high quality roadway design and low population density nearby.

The Resource Conservation and Recovery Act (Public Law 94-580) requires the Administrator of EPA to promulgate regulations, applicable to transporters of hazardous wastes, as may be necessary to protect human health and the environment. Standards applicable to transporters of hazardous waste are to be consistent with the requirements of HMTA (5). EPA has not issued any routing regulations to date.

Implications of Federal Laws and Regulations

The Federal laws and regulations regarding the transport of hazardous materials suggest criteria to be used in route selection, such as avoiding heavily populated areas, narrow streets and alleys, and places where crowds assemble. However, Federal guidance does not specify the width of a narrow street or alley or define "heavily populated areas" or "places where crowds assemble." This guidance, unless more clearly specified, could lead to considerable inconsistency. For example, a narrow street in Wichita may have the same width as a boulevard in Boston, and population density considered "light" in Boston may be considered heavy in Wichita.

In an attempt to overcome potential inconsistency, several Federal agencies are considering rule making to tighten-up routing criteria for certain commodities--as witnessed by NRC's rule making for spent radioactive fuel and MTB's intent to provide routing criteria for radioactive substances. However, as discussed below, several states and local communities have already enacted legislation to define the Federal guidance more clearly.

State Regulations

The States' response to federal regulations concerning routing of hazardous materials by highway has been mixed. Twenty-six have adopted the Federal routing guidance (49 CFR 397.9), and others have dealt with the matter in a variety of ways (6).

At least six States have adopted routing regulations other than 49 CFR 397.9. For example, Louisiana has regulations for the routing of explosives, and New Jersey for radioactive cargo. California has promulgated extensive regulations pertaining to the operation of carriers of explosive materials; these regulations include routing specifications and the designation of terminals and locations that may be used as safe parking places (7).

Eight States have adopted 49 CFR 397.9 and additional routing regulations. Washington has pending regulations for the routing of extremely hazardous waste. A 1979 law gives the Georgia Department of Transportation authority to issue regulations concerning routing, but at this time none has been promulgated.

Rhode Island has promulgated extensive rules governing the transportation of liquified petroleum gas (LPG) and liquified natural gas (LNG) through the state. For example, such regulations were adopted on April 8, 1978, and included the following provisions (8):

- that all motor carriers transporting LPG or LNG intended for use by Rhode Island public utilities seek approval, prior to each shipment, by filing an application including a certificate that the transport vehicle has been inspected and that a Federal Department of Transportation Safety Permit has been obtained;

- that a copy of the approval be carried in the transport vehicle;

- that the transportation of LPG and LNG be prohibited from 7 to 9 a.m. and 4 to 6 p.m., Monday through Friday;

- that every LNG and LPG transport vehicle be equipped with a two-way radio;

- that all LPG and LNG vehicles have a sign on the rear bumper with 3-inch illuminated letters saying: "Must Stay Back 500 Feet" (152m);

- that all LPG and LNG vehicles keep headlights on at all times;

- that all LPG and LNG vehicles be inspected by the driver and appropriate personnel before loading or unloading; and

- that all LPG and LNG vehicles have lock-on release valve(s).

National Tank Truck Carriers, Inc. (NTTC) took the State of Rhode Island to court alleging that the regulations regarding the signs, the radio, and the locks were "inconsistent" with DOT regulations and that the State should have applied for a DOT ruling before implementing them. An injunction was issued (U.S. District Court, Providence, Rhode Island) against those regulations, and the State appealed. The Appeals Court, however, allowed the injunction to stand. This decision is particularly important now because many States are developing their own hazardous materials regulations, which can differ from DOT's and thus cause operational problems. The Appeals Court decision essentially affirms the right of a Federal judge to stop State regulations even before DOT rules on consistency; and it even allows the courts to make a ruling if DOT has made none.

On December 20, 1979, DOT published an Inconsistency Ruling relating to the Rhode Island LPG and LNG regulations. The Materials Transportation

Bureau (MTB) of the DOT found certain provisions of the Rhode Island law to be inconsistent with Federal regulations. Under the authority granted in HMTA, MTB found that Federal authority preempts the requirements for permit and permit application, the hours of travel restrictions, written notification of accidents, bumper signs and use of a frengible shank-type lock. The other Rhode Island requirements were not found to be inconsistent with Federal authority.

The States' delegation of authority to promulgate and enforce hazardous materials routing laws provides another contrast with Federal law. More than half the States have two or more agencies with authority to promulgate regulations concerning hazardous materials. Twenty States named three or more agencies. North Carolina listed six agencies, including DOT, the Radiation Protection Commission, and the Pesticide Board. Washington also named six, including the State Patrol and the Department of Ecology. Nineteen States listed one agency, and three listed none. Transportation departments were the agencies with rule making authority named most frequently--mentioned by 27 States. State law enforcement departments had regulatory jurisdiction in 9 States, fire marshalls in 8, and environmental protection agencies in 10. Public utility and public service commissions have jurisdiction in 18 States. Other agencies listed included motor vehicle bureaus, departments of agriculture, and the civil defense office. Only two States named agencies that specifically address hazardous materials transportation. Illinois has a Hazardous Materials Section of their Department of Transportation, and Pennsylvania lists a Hazardous Substance Transportation Board.

State enforcement of hazardous materials regulations is also complex. Twenty States list three or more agencies responsible for enforcing their regulations. North Carolina names eight agencies, Kentucky seven, and Idaho five. Agencies responsible for enforcement include State police forces, fire marshalls, pollution control boards, a civil defense office, public service commissions, and various other State bodies. In all, the States listed over 100 agencies that enforce hazardous materials regulations.

Analysis of State Regulations

More than half the states have demonstrated a willingness to follow the Federal Government's policies for hazardous materials transportation by adopting parts of the federal hazardous materials routing criteria. Where they have promulgated their own routing rules, they tend to limit them to certain substances. The reasons for lack of State initiative in this area are not readily apparent. It may be that States do not perceive this as a problem area calling for regulation. The fact that to date no comprehensive or scientific criteria have been developed in this area may play some part in State inaction. Some States may believe that their turnpike, tunnel,

and bridge regulations, promulgated by separate authorities, are sufficient. Others may be sensitive to the importance of efficient transportation of hazardous materials to their economies. The complications involved in drafting rules that are not in conflict with Federal regulations of hazardous materials transportation may also be a deterrent.

The State-level agencies with power to promulgate or enforce hazardous materials transportation regulations range from State police forces to departments of transportation and include many different agencies. An important finding for this study is that the staffs of these various agencies have a wide range of analytic skills. The risk analysis methodology was developed to provide a variety of users with an understandable and low-cost technique for evaluating alternative hazardous materials routes.

Toll Roads, Bridges and Tunnels Regulations

Shipment of hazardous materials over toll roads, bridges, and tunnels may be subject to regulations in addition to state requirements. Many toll roads, bridges, and tunnels are governed by separate authorities with power to regulate hazardous materials transport. Most of these authorities were created by State legislatures, and their activities are restricted to particular facilities within that State. State statutes grant most authorities the power to raise their own funds. Their ability to issue regulations is also derived from State statutes.

Toll road authorities can enact detailed rules, including those requiring permits and insurance for transporting certain materials. As a result, these authorities have promulgated more stringent regulations than the State and Federal standards for the transport of hazardous materials. Some authorities are even empowered to ban certain materials from the facilities under their control.

The Federal Government has also created similar authorities to govern bi-state facilities and international bridges. These were authorized by Federal statute (9).

According to a compendium published by the International Bridge, Tunnel and Turnpike Association in 1974, there were 20 authorities in 16 States governing 48 toll roads, 41 bodies governing 104 bridges, and 9 authorities in charge of 11 tunnels (10). This compendium also lists the restrictions and regulations imposed by those bodies on their transportation facilities for shipping radioactive materials (Table 1). A DOT guide also summarizes restrictions for specific highways in 21 States, many of which are controlled by these independent authorities. This summary provides information on types of cargo allowed on specific facilities and conditions or restrictions on its

TABLE 1

SAMPLE PAGE FROM THE IBTTA COMPENDIUM

RADIOACTIVE TRANSPORTATION COMPENDIUM

TUNNELS

Facility	Authority	Comment
Chesapeake Bay Bridge and Tunnel	Chesapeake Bay Bridge and Tunnel District P. O. Box 111 Cape Charles, Virginia 23310	Limited quantities of radioactive material are allowed to travel, under permit, on the Chesapeake Bay Bridge and Tunnel, provided they conform to the applicable regulations of the Atomic Energy Commission, the United States Department of Transportation and the Interstate Commerce Commission. The permit is issued by the Office of the Executive Director of the District. A minimum of one day is required for processing of the permit. The Tunnel District regulations exclude weapons of war employing atomic fission or radioactive force.
International Toll Tunnel	Detroit and Canada Tunnel Corporation 151 Atwater Street Detroit, Michigan 48226	Radioactive shipments are prohibited from travel through the Detroit International Toll Tunnel.
Baltimore Harbor Tunnel	Maryland Transportation Authority P. O. Box 8755 Baltimore, Maryland 21240	Limited quantities of radioactive materials are allowed to travel through the Baltimore Harbor Tunnel, under permit, provided they conform to the applicable regulations of the Atomic Energy Commission, the United States Department of Transportation and the Interstate Commerce Commission. The permit is issued by the Office of the Manager of the Tunnel and a minimum of one day must be allowed for inspection and processing of the permit.
Callahan-Sumner Tunnels	Massachusetts Turnpike Authority Suite 3000, Prudential Center Boston, Massachusetts 02199	Radioactive shipments are prohibited from travel through the Callahan-Sumner Tunnels.
Holland Tunnel Lincoln Tunnel	The Port Authority of New York and New Jersey One World Trade Center, 56N New York, New York 10048	Limited quantities of radioactive materials are allowed to travel through the Holland and Lincoln Tunnels, under permit, provided they conform to the applicable regulations of the Atomic Energy Commission, the United States Department of Transportation and the Interstate Commerce Commission. The permit is issued by the Manager of the individual facility and two hours must be allowed for processing of the permit.
Brooklyn-Battery Tunnel Queens-Midtown Tunnel	Triborough Bridge and Tunnel Authority Triborough Station, Box 35 New York, New York 10035	Radioactive shipments are prohibited from travel through the Brooklyn-Battery or Queens-Midtown Tunnels.

SOURCE: (10)

passage (11). For example, in California the carrier must have enough insurance to cover potential damages to State facilities before crossing the Benicia Martinez Bridge on I-680, and on the San Francisco-Oakland Bay Bridge specific flammable liquids are prohibited. Restrictions on New York City's Goethals Bridge allow any type of hazardous cargo across but only at certain periods of the day.

The regulations governing transport of hazardous materials through tunnels are equally diverse. The Memorial Tunnel on the West Virginia Turnpike allows all hazardous cargos to pass through without restrictions; while the Eisenhower Memorial Tunnel in I-70 west of Idaho Springs, Colorado, allows no hazardous materials unless the Loveland pass is closed--at which time they are allowed through under strict, controlled conditions. Between the spectrum of no control and total prohibition are such regulations as: the Houston, Texas Washburn Tunnel, which allows only radioactive materials; the Chesapeake Bay Bridge Tunnel, which allows small quantities of compressed gas and combustibles; and Virginia's Big Walker Mountain Tunnel, which allows only compressed gas, combustibles, and poisons. Other tunnel, bridge, and roadway authorities have still different variations of these regulations. However, the above examples serve to emphasize that these authorities are generally somewhat more restrictive than State or Federal regulating bodies.

Implications of Toll Roads, Bridges, and Tunnels Regulation

Toll road, bridge, and tunnel authorities have been able to enact more detailed and stringent regulations for hazardous materials transportation than Federal and State lawmakers. This may result from basic structural differences between an independent highway facility authority and a government body. Due to their degree of independence, facility authorities have few of the political considerations that can complicate and delay governmental law or rule making processes. Toll facility authorities have no direct constituencies to serve and thus operate in a more insulated regulatory environment.

Facility authorities also have a necessarily limited jurisdiction, relieving them of the responsibility of creating comprehensive regulations. Required only to regulate hazardous materials transportation on a limited number of facilities, such authorities can generate rules conforming to the specific needs of these facilities. On the other hand, government bodies must consider vast numbers of facilities varying widely in characteristics, and they also have responsibility for businesses and consumers who rely on efficient commercial shipment.

The limited jurisdiction of facility authorities makes it easier for them to enforce regulations. The nature of toll roads, bridges, and tunnels is such that they have limited and controlled access points routinely staffed and patrolled.

Toll roads, bridges, and tunnels are often financed privately from bond sales and are thus major private investments needing protection. Possible interruption of service or extensive damages caused by hazardous materials accidents, and resulting financial losses provide increased incentive for stringent regulations. Another factor is insurance considerations for these facilities.

An examination of the specific rules of these authorities suggests that while the respective authorities do not agree on specific criteria for routing hazardous materials, they have nevertheless explicitly or implicitly emphasized certain criteria. Explicit criteria include the insurance requirements of the carrier and the time of day rules. The insurance requirement assures the authority that the carrier can afford repair costs if a mishap occurs. Allowing the hazardous materials transport only at a certain time of day or after other traffic is stopped shows direct concern with hazardous materials vehicle exposure to other vehicles.

Implicit criteria may include, for example, prohibiting flammables--which might suggest a lack of proper response equipment for a tunnel or structural concern for a bridge. Allowing only specific quantities of material might suggest that the authorities have calculated the probable consequences of certain hazardous materials and are convinced that their facility can withstand a potential mishap involving the specified quantity of material. The diversity of regulations suggests that risk may be perceived differently or that the communities served by the facility are economically dependent on the transport of the material. Regardless of the reasoning behind these diverse rules, one factor is clear: any guidance provided in this project must deal with the type and amount of hazardous material and be flexible enough to be used by a wide range of facility operators.

<u>Local Ordinances and Regulations</u>

In addition to the examination of Federal and State statutes and the applic able regulations, nine cities were selected randomly to determine what types of ordinances and restrictions might be encountered at the local level. The cities were chosen on the basis of their geography, size, interstate routes within their territorial boundaries, and previous knowledge of regulations pertaining to hazardous materials accidents. In accordance with these criteria, cognizant agencies were contacted in Baltimore, Chicago, Dallas, Los Angeles, New York City, Portland, Providence, Salt Lake City, and Savannah.

Baltimore (12)

The city of Baltimore is empowered to enact laws and regulations relating to the transportation of hazardous materials. Furthermore, the Commissioner of Transit and Traffic in Baltimore has the power to establish routing restrictions. All carriers of hazardous materials must comply with the existing truck routes designated in the city. Baltimore once had specific restrictions concerning the roads hazardous materials carriers may use, but residents of those streets objected to this form of routing. As a result, the city now requires a permit only for carriers of explosives. When the Baltimore City police force serves as an escort to these carriers, it tries to keep hazardous materials carriers away from the vicinity of hospitals, retirement homes, and other quiet facilities.

Chicago (13)

The Bureau of Street Traffic in Chicago regulates intercity movement of hazardous materials in Chicago. It tries to follow State and Federal regulations based on the theory that uniformity of hazardous materials laws and regulations is a desirable goal. The Illinois Department of Transportation has designated truck routes through Chicago. According to Traffic Regulations of the city of Chicago, Chapter 27, Municipal Code (27-334-341), trucks can use the closest means of getting to a facility. But the Bureau of Street Traffic has indicated its hope that carriers with hazardous materials would circumvent the city of Chicago whenever feasible.

Dallas (14)

A major rail transportation accident involving hazardous materials, resulting in $5 million of property damage in Dallas, encouraged the formation of a committee headed by the Dallas Fire Department. The committee's duties were to investigate the practices of hazardous materials transportation and make subsequent recommendations. During the study, the committee discovered what they interpreted as a dearth of regulations in the area of hazardous materials transportation.

Pursuant to the Advisory Committee's recommendations, Dallas passed Ordinance No. 1594, empowering the Fire Department and other Dallas peace officers to enforce the following regulations:

- Hazardous materials carriers are prohibited from traveling:
  - on any road that has to be excavated below ground level (cuts);

- on high overheads; and

- in tunnels.

- Otherwise, carriers of hazardous materials must stay on the interstate highways and cannot enter the city limits unless making a local delivery.

Los Angeles (15)

Los Angeles currently has no specific routing restrictions for hazardous materials. Although it is in the process of establishing regulations restricting the movement of hazardous materials within the city, certain weight restrictions apply to all trucks whether or not they are carrying hazardous materials. Commercial streets are favored over residential streets for truck routes, and restrictions also apply in terms of times of day and traffic situations.

New York (16)

The New York City Department of Transportation has promulgated only one regulation in the area of transportation of hazardous materials. Subsection 158 of Article 15 of the New York City Traffic Regulations establishes certain route requirements for carriers of radioactive materials.

> 158. Transportation of Radioactive Materials
>
> Shipments of radioactive materials meeting or exceeding the specifications of "large quantities" and/or "fissile Class III" as specified by the Interstate Commerce Commission and the Atomic Energy Commission, shall follow the same truck routes designated for vehicles having an overall length of 33 feet or more, in Article 16 of the New York City Traffic Regulations.

In addition to the Department of Transportation's regulation, the City's Department of Health has promulgated one of the most significant local regulations in the field of hazardous materials transportation. Section 175.111 became effective on January 15, 1976, and effectively forbids the transportation of most nuclear fuel cycle materials in or through the city. The New York law is an interdiction of truck traffic in radioactive materials from facilities on Long Island, New York, through the city to destinations in other States. Section 175.111 led to a denial of Injunctive Relief in the Federal District Court for the Southern District of New York and an inconsistency ruling by DOT as to whether Section 175.111 is inconsistent with, and thus pre-empted by, the HMTA or regulations issued thereunder (17). In the injunction action, the Federal Government argued that Section 175.111 was

preempted under the Supremacy Clause and the Commerce Clause of the United States Constitution, and by the Atomic Energy Act of 1954 and the regulations issued under that Act.

On April 4, 1978, DOT held that Section 175.111 was not inconsistent with the requirements contained in the text of the HMTA. Express preemption under Section 112 of the HMTA occurs upon the existence of mutually inconsistent HMTA and State or local requirements. Thus, DOT held that Section 175.111 of the New York Health Code was valid and enforceable.

Portland (18)

Portland has no routing regulations but is considering studying the transportation of hazardous materials. No structured program currently exists in Portland.

Providence (19)

The city of Providence has not promulgated any regulations in the area of hazardous materials transportation.

Salt Lake City (20)

Salt Lake City had a law that restricted the carriers of corrosives or flammable substances to certain streets in the city. Furthermore, the law applied 49 CFR 397.9 to Salt Lake City. However, the courts in Utah ruled that these city ordinances were preempted by the State. The court held that the State is supposed to set hazardous materials routes through the cities. As of June 1979, the State of Utah has not established specific routing guidelines for Salt Lake City.

Savannah (21)

The city of Savannah has not enacted any law or regulation on the subject of hazardous materials transportation. Presently, the only enforceable routing restrictions in Savannah are those already established for all trucks. These restrictions apply to residential streets and streets in the historical areas of Savannah.

Analysis of Local Regulations

Local regulation of hazardous materials transportation varies greatly in substance and extent. City governments face jurisdictional questions, particularly when dealing with State or interstate highways. One city contacted has no jurisdiction over interstate highways within its boundaries. Another city's

regulations were struck down after a court ruled that routing regulations are a State function. Such jurisdictional questions will be decided by the form of State constitutions, laws, and judicial interpretation.

Only two of the nine cities studied have enacted their own routing restrictions. NRC's new regulation will probably affect New York's ban on radioactive materials transportation. The Dallas regulations, enacted after a major rail accident, are strict but general in nature. Some cities are empowered to issue regulations but have not done so up to now.

Although city governments are becoming increasingly aware of the need for hazardous materials routing guidelines, the relationships of cities to the Federal and State governments may complicate the regulation of hazardous materials routing at this level. Finally, from the local perspective, it would seem that there are many regulations; in fact, an examination of the substance of many of the regulations has shown just the opposite. Also, Baltimore's experience with moving a hazardous materials route after hearing citizens' objections suggests the need for citizen input in the decision process regarding hazardous materials route selection.

Variable Factors

One of the central themes of this study was to identify and prioritize the numerous variable factors that can affect hazardous materials route selection. Table 2 presents a list of potential variable routing factors that apply to highway and traffic conditions.

Unfortunately, highway transport of hazardous materials has only recently become the subject of heightened public concern, and thus the body of prior research in this field is limited. Based on existing research, there is no uniform or reliable method to determine which of the factors in Table 2 are the most important roadway factors for hazardous materials route selection. The study addresses this inadequacy by presenting a process for determining which of the variable factors should be included as route selection criteria. In addition to variable roadway factors that might contribute to the likelihood of an accident, routes should be designated on the basis of what the potential consequences would be if there were an accident. The concept of consequence variables and their priorities will be explored fully in Section 3. The remainder of Section 2 will present an analysis of roadway variable factors and their role in the route selection process.

The fundamental question associated with this aspect of the study is: which roadways are characterized by above-average hazardous materials accident rates? This question may be addressed by reviewing data already collected

TABLE 2

VARIABLE ROADWAY FACTORS

Traffic Conditions	Road Conditions	Hazardous Materials Transport
ADT	Grade, curvature, access, speed limit, shoulder width	Trip origin and destination
Traffic density by time of day/day of week		Type and quantity of hazardous materials (including packaging, magnitude, and nature of potential threat to life and property)
Accident and incident rates	Conditions under adverse weather conditions: icing, fog, wet	Vehicle type used to transport
Average travel speeds		Driver perceptions (including ease of use of a route; benefits/disbenefits such as time costs; turns, circuity, and signing)
Traffic mix	Street width	
Speed variance	Pavement condition	Economics of routing (including equipment utilization, mileage, travel time, costs)
Stops at signalized intersections	Number of intersections	
	Traffic controls	
	Traffic operation (1-way, 2-way)	
	Parking	

for a locale or by using the methodology presented below which relies on predictive models and accident data collected at the national level. In all cases, the study recommends using local data first and then nationally derived information as default parameters for communities lacking the required information. For communities that do not know the accident rates on their roadways, the study searched the literature to determine which roadway features are most likely to cause an accident. On the basis of this information the hazardous materials route could be designated to avoid particularly dangerous roadways and thereby reduce accident probabilities. The approach used to identify these dangerous roadway features and geometrics was, first, to review the literature and, second, to convene a panel meeting of knowledgeable persons and solicit their opinions. The findings from these two tasks were subsequently used to select predictive models for forecasting the likelihood of an accident given certain highway conditions. Each step of the chronology is discussed in detail below.

Literature Review

A limited amount of work has been done to date relating the probability of a truck accident to the traffic environment or roadway design. Since the focus of this task was to identify factors that can be realistically controlled (or avoided), studies identifying drivers, vehicles, or the weather as causes were not useful. Only two sources were found which analyzed truck accidents and roadway geometrics (22) (23). One (22) was of little value because only a few specific accident types were investigated, and it was not possible to generalize these findings to a wider class of accidents. The other study (23) was also of limited value, as the report is in draft form and its specific findings are unavailable.

Because of the lack of information on truck accidents and their roadway-related causes, it was necessary to rely on accident data that had been collected for both automobiles and trucks (not stratified by vehicle type). Although this approach has certain obvious limitations, a lack of data on the causes of hazardous materials accidents led the contractor to make the assumption that roadway and traffic conditions that result in above average accident rates for all vehicles pose a similar threat for trucks alone.

The literature review revealed two general areas of investigation in accident rate research. One centered around primary observations on specific roadway types and calculations of the number of accidents per million vehicle-miles on those segments. The observations were made on segments with similar geometrics (e.g., curved sections of rural highways) and were often stratified by ADT levels. The value of this technique is its straightforward and understandable methodology; the disadvantage is the limited number of simultaneous influences which can be considered. Most of the explanatory

relationships were essentially bivariate, i.e., accident rates as a function of one roadway characteristic (24) (25) (26). Table 3 presents representative findings on accident rates that can be associated with specific roadway geometrics for three roadway types. Unfortunately, this information did not suit the needs of the study as there was no acceptable way to combine these accident rates for roadways possessing numerous characteristics within the same segment.

The other body of research in accident causation is the specification and calibration of multi-variate regression models. These models attempt to predict accident rates on the basis of several roadway and traffic conditions. Essentially, they are based on observations of segments with several features. By combining the observed accident rates which occurred under varying conditions, the model assigns a weight to the influence of each characteristic. Although the reliability and precision of these models is subject to debate, they offer the only method for comprehensive accident analysis. Therefore, accident rate predictive models that may be used in the probability methodology are discussed in detail below. The findings from the panel meeting were used to help identify which variables in Table 2 were most important and should be included in the models.

Panel Ranking of Factors

To determine the relative importance of factors that might influence the selection of hazardous materials routes, a multi-disciplinary panel was convened and panelists were asked to make paired comparisons among the range of possible route selection factors in order to determine which are most important. Factors were weighted for several hazardous materials topics, including: hazardous materials accident causes, carrier compliance with hazardous materials routings, and roadway characteristics as hazardous materials accident causes. The 13 panel members included representatives from Federal, State and Local governments and the motor-carrier industry. Panel members were chosen to provide a wide range of perspectives as well as to represent the various interests that might be affected by hazardous materials routing decisions. Panel members who work at the City level included a Fire Chief, a Civil Defense and Emergency Preparedness representative, a traffic engineer, and a community planner. Two of the State-level panel members were responsible for hazardous materials transportation within their respective states. One panel member is the safety director for a major hazardous materials tank truck carrier company. Federal representatives were drawn from the MTB, Bureau of Motor Carrier Safety (BMCS), and the National Transportation Safety Board (NTSB). Results from the accident cause ranking exercises are presented below.

TABLE 3

ACCIDENT RATES AND GEOMETRIC FEATURES

(ACCIDENTS/MILLION VEHICLE–MILES)

Volume — SOURCE: (25)

ADT (000)	Interstate/Freeways Rural (4-L)	Interstate/Freeways Urban (4-L)	Rural Highways 2-L	Rural Highways 4-L(U)	Rural Highways 4-L(D)	Urban Arterials 2-L	Urban Arterials 4-L(U)	Urban Arterials 4-L(D)
1-1.9	1.12	—	2.12	1.8	—	3.42	—	—
2.0-3.9	.92	1.41	1.98	2.19	2.00	3.98	10.38	—
4.0-7.9	.94	1.34	2.19	2.51	1.72	5.13	8.38	4.21
8.0-15.9	.93	1.24	2.71	2.61	2.35	5.94	7.55	4.86
16.0-23.9	.91	1.28	—	—	2.53	6.74	6.82	5.94
24.0-35.9	.93	1.58	—	—	2.48	—	5.85	6.19
36.0-51.9	—	2.44	—	—	—	—	—	—
52.0-75.9	—	3.87	—	—	—	—	—	—
76.0	—	—	—	—	—	—	—	—

Intersections/Mile — SOURCE: (25)

Interstate/Freeways: Not Applicable

Intersections Per Mile	Rural Highways 2-L	Rural Highways 4-L(U)	Rural Highways 4-L(D)	Urban Arterials 2-L	Urban Arterials 4-L(U)	Urban Arterials 4-L(D)
0	1.72	1.45	1.81	—	1.78	1.81
.01-1.0	1.98	1.28	1.34	2.48	—	—
1.01-3.0	2.14	2.42	2.46	2.98	2.81	2.71
3.01-6.0	2.79	2.87	2.77	4.70	5.29	4.94
6.01-15.0	5.20	5.44	4.43	7.12	8.38	6.79
15.01-25.0	4.63	—	—	12.82	8.38	9.42

Businesses/Mile — SOURCE: (25)

Interstate/Freeways: Not Applicable

Businesses Per Mile	Rural Highways 2-L	Rural Highways 4-L(U)	Rural Highways 4-L(D)	Urban Arterials 2-L	Urban Arterials 4-L(U)	Urban Arterials 4-L(D)
0	1.51	2.53	1.32	—	2.85	2.54
.01-3.0	1.98	2.01	1.88	3.40	4.45	6.08
3.01-10.0	2.60	2.14	2.38	3.22	4.13	3.33
10.01-20.0	3.78	3.44	3.46	4.38	5.74	5.21
20.01-40.0	5.01	5.63	4.58	6.82	6.19	7.30
40.01-80.0	5.34	5.03	4.14	6.14	8.38	10.88
80.01-160	—	—	—	12.13	10.48	—

Curves — Stratification: Not Applicable

Interstate/Freeways (SOURCE: (26)):

Degrees of Curvative	All Freeways
< 1°	.88
1°-4°	1.37

Rural Highways (SOURCE: (24)):

Degrees of Curvative	2-L	4-L(U)	4-L(D)
0-2.9	1.8	1.9	1.9
3-5.9	2.5	2.8	2.4
6-9.9	2.8	3.3	3.1
10	3.5	1.2	6.7

Urban Arterials: Not Available

Grade — Stratification: Not Applicable

Interstate/Freeways (SOURCE: (26)):

Percent Grade	All Freeways
< 2	.88
2-6	1.50

Rural Highways (SOURCE: (24)):

Percent Grade	2-L	4-L(U)	4-L(D)
< 3	2.2	2.7	2.9
3-3.99	2.3	2.8	2.5
4-4.99	2.2	2.0	2.8
5-5.99	3.1	2.3	1.5
6-6.99	2.2	2.4	1.4
≥7	3.7	2.8	3.3

Urban Arterials: Not Available

Median — SOURCE: (25)

Stratification	Interstate/Freeways Rural (4-L)	Interstate/Freeways Urban (4-L)	Rural Highways 2-L	Rural Highways 4-L	Urban Arterials 2-L	Urban Arterials 4-L	Urban Arterials 6-L
Divided	.93	1.72	—	2.43	—	6.97	8.80
Undivided	—	—	—	2.83	—	4.94	3.90

Curves and Grades — Stratification: Not Applicable

Interstate/Freeways (NOTE: All Freeways; SOURCE: (26)):

Degrees of Curvative	Percent Grade Up < 2	Percent Grade Up 2-6	Percent Grade Down 2-6
< 1°	.84	.94	1.13
1°-4°	1.13	1.75	2.02

Rural Highways (NOTE: 2-L Only; SOURCE: (24)):

Degrees of Curvature	Percent Grade < 3	Percent Grade ≥ 3
0-2.9	1.8	2.2
3-5.9	2.4	2.8
6-9.9	2.8	2.5
≥10	3.2	3.8

Urban Arterials: Not Available

Accident Causes

The panel ranked hazardous materials driver error and environmental conditions (weather, lighting, etc.) as the two most important causes of hazardous materials accidents. Some panelists also felt that "other motorists" were more important than the group ranking of fourth out of five. Roadway characteristics ranked third, and subsequent discussions indicated that this factor was relatively unimportant in the overall context of hazardous materials accident causes (see Table 4). Of the three major factors that might be responsible for an accident--driver, vehicle, or operating conditions--the driver is widely recognized in the literature as the most frequent single reason. However, this research effort only addresses the roadway operating conditions. Other federal agencies are or will be addressing these other aspects. The panel's consensus that roadway characteristics were not major accident causes supports the previous statement that in the overall context of accident analysis, the scope of this project addressed only a portion of the total hazardous material transport issue.

It is noteworthy that the two factors strongly influenced by government--roadway design and vehicle performance (through safety inspections)--rank low as explanatory variables for hazardous materials accidents. Two possible explanations are: (1) that government has been successful in designing safe roads and prohibiting unsafe vehicles from operating, and (2) that human behavior is so variable that driver performance is the overriding consideration and roadway and vehicle characteristics are insignificant by comparison.

Another objective of this study was to attempt to identify components of the hazardous materials transport system where small improvements might produce large safety gains. Because the panel rated roadway design relatively unimportant as an accident cause, routing criteria based principally on roadway characteristics may not significantly affect accident rates. If routing regulations are unlikely to greatly reduce accident probabilities, attention should be focused on ways to anticipate and respond to accidental hazardous materials releases. This finding implies that more weight should be placed on the "consequences" than the "probability" component of the risk equation.

Roadway Characteristics

Roadway characteristics that panel members considered most likely to cause a hazardous materials accident were typically those factors which required vehicle maneuverability and short braking distances. Specifically, roadways characterized by intersections, frequent stops, businesses, turns, high traffic density, and high travel speeds were felt to be the most dangerous. Table 5 presents the panel's roadway feature rankings.

TABLE 4

PANEL RANKING OF ACCIDENT CAUSES

FACTOR	RANK
Hazardous materials driver error	1
Environment (weather, lighting)	2
Roadway design and characteristics	3
Other motorist error	4
Hazardous materials vehicle performance	5

NOTE: The factors were ranked according to the likelihood of their contributing to a hazardous materials motor carrier accident; the number 1 rank is for the most important factor.

TABLE 5

PANEL RANKING OF ROADWAY CHARACTERISTICS AS ACCIDENT CAUSES

FACTOR	RANK	
	All Panel Members	Select* Panel Members
Intersections	1	1
Actual travel speeds	2	5
Traffic density (ADT)	3	2
Business along roadway	4	3
Topography (grades, curves)	5	4
Structures (bridges, ramps)	6	8
Absence of shoulders	7	7
Absence of median	8	6
Number of lanes	9	9
Pavement surface	10	10

NOTE: The factors were ranked according to the likelihood of their contributing to a hazardous materials motor carrier accident; the number 1 rank is for the most important factor. (The factors apply to non-interstate highways only.)

*** Subset within the panel of traffic engineers and persons knowledgable about truck operations.**

When the rankings of a subset of traffic engineers and persons knowledgeable about truck operations were computed, some substantial differences became apparent. For example, the subset ranked topography (curves and grades) as a much greater threat (ranked second) than travel speeds (ranked fifth). These rankings reflect the belief that a truck changing course is more likely to have an accident than one increasing its speed but proceeding straight. The "business along roadway" factor was also ranked higher by the select group than by the entire panel, presumably because the uncontrolled access and egress would create more need for maneuvering and stopping. Both groups put shoulders, medians, number of lanes, and pavement surface in the bottom half of the rankings.

ACCIDENT RATE MODELS

The study research and recommendations of the panel led to the conclusion that the relative safety of alternative routes could be determined by using multi-variate models which predict accident rates as a function of roadway features. (This assumes that historical accident rates are not available.) The variables cited consistently in the model literature as the most important factors in accident analysis were related to traffic conflicts and situations that demanded driver interactions, i.e., intersections and traffic volumes. The following discussion traces the review of possible models and the rationale for final model selection.

Model Selection and Evaluation

Because of the highly unpredictable nature of accidents, attempts to model their underlying causative relationships are constrained by the erratic and subtle influences which may cause accidents in some situations and not others. The same combination of physical factors may be present when an accident does or does not occur. It is thus not a simple matter to fit accident behavior to mathematical models. Taking into account these limitations, the study endeavored to find models that produce consistent and intuitively correct predictions. Another criterion in model selection was ease of application and use of readily available data. Table 6 is a summary of some of the models rejected because of their complexity, poor predictive powers, unusual data requirements, etc.

In the final analysis, three different models were chosen to predict accident rates on the following three roadway types:

- interstates;
- urban arterials; and
- rural highways.

TABLE 6
MODELS REJECTED FOR PROBABILITY CALCULATIONS

MODEL	DEPENDENT VARIABLES	INDEPENDENT VARIABLES	N	R^2	COMMENTS
Interstate Accident Research Study-1 (1970) SOURCE: (25)	• Total Accident Rate	• ADT • unit length • years since I-S • opening • # businesses/mile • # intersections/mile • interaction terms	• 1955-1967 • 39 states • 7,000 miles each in I-S, rural & urban • 90 billion vehicle-miles	9 models: .237/.117/.149 .221/.151/.161 .053/.024/.145	• Poor predictive ability
Accident Rates/ Design Elements of Rural Highways (1968) SOURCE: (29)	• Total accident rate • One-vehicle accident rate • Multi-vehicle accident rate • Injury-producing accident rate (includes total) • Curve (4%)	• ADT • Grade (<4%<) • Intersections (one or more) • Structure (one or • more) • Median • # lanes • Access control	.03 mile segments Ohio = 46,591 Fla. = 25,800 Conn. = 6,572	All models and coefficient reported are *significantly* different from O at P = .05	• Rural only
Cost & Safety Effectiveness of Highway Design Elements (1978) SOURCE: (32)	• Total accidents • PDO • Injury & Fatal	• Shoulder width • Shoulder surface • Pavement width • Terrain • Number of lanes • Urban/rural • ADT • Horizontal curve	Complete data bases for Maryland, New York, and Washington	Low . . . usually less than .08	• Statistical validity suspect
Environmental Determinants of Traffic Accidents: An Alternate Model (1974) SOURCE: (33)	• Number of accidents • Accident rates	• Traffic volume • Percent of developed frontage • Percent of commercial frontage • Percent of population between 16 and 24 • Population density • Road type	• 13,498 accidents • 135 two-mile long segments	.89/.89 .89/.88 .69	• Data requirements too complex
Effects of Roadway & Operational Characteristics on Accidents on Multi-Lane Highways (1967) SOURCE: (34)	• Injury accident rate • Fatal accident rate • Total accident rate	• ADT • Intersections/mile • Signalized intersections/mile • Openings (excl. intersections/mile) • Median width • Speed limit • "Access point index"	• 92 sections from 1 to 32 miles long • 6,417 accidents	.69 All variables in final model significant	• Requires "access point index" calculation

These three models are intended for use if the analyst lacks superior local knowledge. Models which have been developed locally or calibrated to local conditions will probably produce more accurate results. The three models were chosen for the study to provide the reader with a readily available reference for estimating accident rates. Similarly, the models which were rejected for universal application may prove better suited to a particular community's needs.

Interstate Model

This model predicts accident rates on the basis of average daily traffic (ADT) volumes (27). ADT has proved a reasonably good predictor of accidents on interstates, probably because of the high design standards on interstates and the general lack of variation in geometrics. Thus, most accidents on interstates appear to be related to traffic conditions rather than to roadway characteristics (28).

Urban Arterial Model

A multi-variate linear regression model was chosen from the literature to predict accident rates on urban arterials (30). Urban arterials are major streets within urbanized areas that typically experience high traffic volumes and generally lack access controls. The urban arterial model predicts the annual number of accidents per mile on a segment based upon the ADT, number of heavy volume intersections per mile, and number of signalized intersections per mile. A conversion factor is used to change annual accidents per mile to accidents per million vehicle-miles.

Rural Highway Model

The rural highway model is specified to account for three variables: ADT, average highway speed (AHS), and terrain (27). AHS is defined as the highest average overall safe and comfortable speed attainable under light traffic conditions without exceeding the posted speed limits. In general, AHS equals the posted speed limit. The model uses three categories of terrain, as defined by the Highway Capacity Manual: level, rolling, and mountainous (31). (See Reference (31) for terrain definitions).

All three models are discussed in greater detail below.

DETERMINING THE PROBABILITY OF A HAZARDOUS MATERIALS ACCIDENT

The technique developed from the above analysis to determine the probability of a hazardous materials accident uses the accident rate for all vehicles

and subsequently factors that rate to reflect the much smaller share of hazardous materials vehicles in the traffic stream. The factor used to adjust total accident probabilities to hazardous materials accident probabilities was derived by dividing the number of hazardous materials accidents reported to the MTB during a 4 1/2 year period by the total number of vehicles accidents during the same period. Accident rates in themselves are not probabilities until they are adjusted to reflect the amount of exposure a vehicle experiences. Not all motorists face the same likelihood of being involved in an accident because the number of miles they drive varies. The sequence of steps to determine the probability of a hazardous materials accident is as follows:

- Determine the accident rate for all vehicles on a particular roadway type.
- Calculate the probability of an accident for any vehicle based on vehicle exposure (same as roadway length).
- Factor the probability statement for any vehicle to reflect the incidence of hazardous materials vehicles in the traffic stream.

The general form of the probability equation is:

P (H.M. Accident) = (All Vehicle Accidents/Vehicle-Mile)x(Segment Vehicle-Miles/Vehicle)x(H.M. Accidents/All Vehicle Accidents)

The basic component of the probability calculation is the accident rate for a given segment or the number of accidents per million vehicle-miles (acc/mvm). Accident rates are often available from State or local highway departments. Alternatively, accident rates may be predicted using the models presented below if the rates are not available from historical data. The study recommends that historical data on accident rates be used whenever possible to preserve the greatest amount of accuracy in the risk analysis. However, if observed accident rates are used on one route and compared to the predicted rates on an alternative route, the analyst should be aware of possible biases and try to compensate for potential over- or under-predictions by the models when applied in a particular community. This limitation is due to the level of precision of the predictive models and the underlying nature of the risk analysis technique. The risk values ultimately calculated for each route have limited meaning as absolute numbers; rather, it is the relative values that are important. If the calculated probability of a hazardous materials accident on one route is higher than on another route, the question of which route is more dangerous can only be answered if the analyst is confident that the predicted values are truly representative of actual conditions.

The probability component of the risk equation is based on the total accident rate for all vehicles. The ideal measure would be the accident rate for

hazardous materials carriers or trucks in general. Unfortunately, this information was not available, and total accident rates for all vehicles was chosen as the best alternative. Efforts to use only injury producing accident rates or fatal accident rates were unsuccessful because of an inability to relate hazardous materials releases to injury or fatal accidents versus total accidents. Because even under basically similar conditions, widely varying circumstances can result in serious damage in one accident and relatively minor damage in another, the study chose to use total accident rates and not attempt to hypothesize relationships for which no data could be developed to substantiate or refute them.

The following sections present a methodology to calculate hazardous materials accident probabilities and identify the data required for these calculations. The methodology is presented step by step; it begins by identifying the potential alternatives and segmenting the routes into components which can be conveniently analyzed.

(1) Identify Alternatives and Segment Routes

Identify Alternative Routes

With the aid of regional road maps, a first-cut should be made at identifying those routes which: appear to satisfy community objectives; are reasonably compatible with existing hazardous materials trucking practices; and are void of physical mandatory factors which preclude their use. Limitations on staff time will preclude analyses of all potential alternatives, and this subjective selection of routes to be analyzed relies on a knowledge of local demography, roadways, and traffic conditions. The general rule-of-thumb to be followed at this stage in the analysis for the through transport of hazardous materials is to route them as much as possible on interstates because of their better safety records and away from populated areas. The analyst shoud be wary of excluding potential alternatives arbitrarily but must make some subjective judgements at this point to reduce the number of options to a manageable list.

Segment Routes

The purpose of segmentation is to divide the routes into discrete segments which can be analyzed more easily. The first criterion for segmentation is roadway functional type. The three categories to be used are:

- interstate;
- urban arterials; and
- rural highways.

Within the interstate category, segments should be divided into two groups; urban areas, and suburban/rural areas.

The second criterion for segmentation is census tract boundaries. These boundaries should be considered concurrently with traffic volume data (and the way the data are recorded along the route) or accident rates (and the segments for which accident rate data have been collected).* Segment boundaries should be coordinated for the roadway probability data and census population data to facilitate the risk calculations which follow. Because risk is calculated by multiplying the accident probability times the number of people exposed, it is important to calculate the values for each component of the risk equation based on the same segment boundaries.

After the accident rate methodology has been selected, routes are segmented within each roadway functional type whenever large changes in ADT or accident rates are observed. Thus, if the accident rate changes by $\pm$ 25 percent or more between segments designated by the recording agency, these segments will be logical breakpoints for the risk analysis. Likewise, if ADT changes of similar magnitude are observed, the analyst should segment the route to represent these varying traffic conditions without creating excessive detail. Although the risk calculations are relatively straightforward, it is recommended that route segments range from 2 to 10 miles in length and that no more segments be designated than necessary, in order to minimize the number of subsequent calculations.

(2) Calculate Accident Rates

Secondary Data Sources

If accident rates are available from direct observations on all route segments, the analyst should use these values rather than the predicted values which can be determined using the models presented below. Accident rates on major roadways are typically available from State, regional, or local transportation agencies.

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*Whether the analyst uses accident rates directly or predicts them on the basis of ADT and other variables depends on data availability. This is discussed below under "Calculate Accident Rates," which should be read carefully before the routes are segmented to prevent unnecessary duplication of effort (e.g., segmenting the routes on the basis of ADT data and subsequently discovering that accident rates are available but for different segment boundaries.)

Predictive Models

Accident rates may be calculated using one of the following three linear regression models: interstate, urban arterial, or rural highway. These models were chosen after a thorough literature review on the basis of statistical reliability and ease of application. Data requirements for the models are not thought to be excessive but may require some fieldwork, depending on the availability and quality of local traffic data and maps.

Interstate Model (27)

This model predicts accident rates on the basis of ADT volumes. ADT counts are normally available from either State or local traffic engineers. Traffic volumes may also be gathered through field observation although this process is time-consuming and expensive. The general form of the interstate accident rate equation is:

$$y = a + bx$$

where

y = accidents per million vehicle-miles (accidents/mvm)
a = a constant
b = regression coefficient
x = average annual daily traffic (in thousands)

Table 7 presents the model constants and coefficients for interstates of varying widths and in different areas. Urban areas are defined as having a population of 5,000 or more. Suburban is defined as in urban area but not within a city's limits. All other areas are considered rural. For example, to calculate the accident rate on a 6-lane, urban interstate with average ADT of 80,000 vehicles, the equation would be:*

$$y = .80 + .011(80)$$
or
$$y = 1.68 \text{ accidents/mvm}$$

*See Appendix H for additional description of predictive equations.

TABLE 7
PREDICTIVE PARAMETERS FOR INTERSTATE EQUATIONS

CATEGORY	CONSTANT (a)	COEFFICIENT (b)
Rural/Suburban		
4-lane (ADT $>$15,000)	0.83	0.007
6-lane	0.45	0.012
8-lane	0.42	0.007
Urban		
4-lane	0.80	0.020
6-lane	0.80	0.011
8-lane	0.73	0.007
10-lane	0.16	0.010

SOURCE: (27)

Urban Arterial Model (30)

A multi-variate linear regression model is used to predict accident rates on urban arterials (30). Urban arterials are defined as major streets within urbanized areas that typically experience high traffic volumes and generally lack access controls. The general form of the equation is:*

$$y = -0.261 + 1.256\, x_1 + 3.909\, x_2 + 6.086\, x_3$$

where

y = number of accidents per mile annually
x_1 = volume (ADT) in thousands of vehicles
x_2 = number of heavy volume intersections per mile (intersections with arterial streets)
x_3 = number of signalized intersections per mile

The model predicts annual accidents per mile rather than accidents per million vehicle-miles. To convert to an accident rate, the predicted y value is divided by ADT times 365 days/year:

$$\frac{y(\text{acc/mi/yr})}{\text{ADT(veh/day)} \times 365\ (\text{days/yr})} \times 10^6 = y\ (\text{acc/mvm})$$

Rural Highway Model (27)

The rural highway model is specified with three independent variables: ADT, AHS, and terrain. AHS is defined as the highest average overall safe and comfortable speed attainable under light traffic conditions without exceeding the posted speed limits. In general, AHS equals the posted speed limit. Three categories of terrain are also used in the model: level, rolling, and mountainous (31).

The rural highway model was calibrated on accident rates and travel conditions for a conventional two-lane uncontrolled access highway with rolling terrain and AHS greater than 55 mph. The general form of the equation for the base case is:*

$$y = 1.87 + 0.65/x$$

where

y = number of accidents per million vehicle-miles
x = average annual daily traffic (in thousands)

The variables terrain and AHS are used as factors to reflect the influence of variations in these characteristics on the base case. Thus, when the terrain is level the total accident rate should be decreased by 20 percent; in mountainous terrain it should be increased by 40 percent. When average highway speeds are equal to or less than 55, the predicted accident rate should be increased by 80 percent (reflecting the fact that more dangerous roads will have lower AHS). Table 8 summarizes the rural highway prediction equation and adjustment factors.

TABLE 8
RURAL HIGHWAY PREDICTIVE
PARAMETERS AND ADJUSTMENT FACTORS

	BASE CASE	TERRAIN FACTORS			AHS FACTORS	
CATEGORY	EQUATION	FLAT	ROLL	MOUNT.	≤ 55	> 55
Rural 2-lane Conventional	$y = 1.87 + \frac{0.65}{x}$	-0.20	0.0	+0.40	+0.80	0.0

SOURCE: (27)

*See Appendix H for additional description of predictive equations.

Roadway Inventory Worksheet

Worksheet 1 (Table 9) is structured to record the necessary roadway data for the segments comprising each alternative route. Some of the columns are only relevant for particular roadway types, and the data required for each segment are a function of the predictive model to be used. The segments are numbered to assist in keeping track of them during the calculations. One technique is to assign each alternative route a number and each segment within the route a letter (e.g., 1-A, 1-B, 1-C; 2-A, 2-B, 2-C, etc.). A large part of the data can be gathered from secondary sources such as city or State traffic counts, roadway classification maps, USGS topographic maps, etc. Other variables, such as the number of signalized intersections per mile, may be more easily collected through observation. None of the data requirements for the predictive models are exotic, and the analyst should have little trouble assembling this information. Obviously, if the accident rates are available from a transportation agency, it is only necessary to fill in columns 1, 2, 5, and 11 (12 is optional), as the information requested in the other columns is for estimating accident rates.

(3) Convert Accident Rates to Probability Statements

The probability of any vehicle being involved in an accident on a specified segment is calculated by multiplying the segment accident rate times its length (or amount of exposure). On Worksheet 1, this is the product of column 5 times column 11. The general form of the equation is:

$$P\ (\text{Accident on Segment } i) = x_i \text{ accidents/vehicle-mile} \times l_i \text{ mile}$$

where

x_i is the segment accident rate*; and
l_i is the segment length in miles.

For example, the probability of any vehicle being involved in an accident on a roadway segment which is 3 miles (4.8 km) long and has an accident rate of 2.0 accidents/mvm is:

$$P(\text{accident segment } i) = 2.0 \text{ accidents/mvm} \times 3.0 \text{ v-m/v}$$

or

$$P(\text{accident segment } i) = 6.0 \times 10^{-6} \text{ accidents/vehicle.}$$

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*Note: The accident rate is expressed in accidents per vehicle-mile rather than accidents per million vehicle-miles.

Alternative: ________

Date: ________

Page____of________

TABLE 9

WORKSHEET 1: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMIT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		

APPLICATION OF PROBABILITY METHODOLOGY TO WASHINGTON, D.C. CASE STUDY

Introduction

The Washington Metropolitan area is served by several interstates, including a circumferential beltway. The SMSA population in 1970 was 2.9 million, and dense residential development has occurred along many parts of the interstates serving the downtown area (particularly I-395). Residential development has also occurred along the Beltway, with heavy concentrations in Northern Virginia and less activity to the east in Prince George's County.

For purposes of the case study, truck traffic was analyzed for vehicles starting from points south of Washington and bound for Route 50 in Maryland.

Each of the analytic tasks presented earlier is applied to the Washington, D.C., case study, as described below.

(1) Identify Alternatives and Segment Routes

Establish Routing Objectives

The purpose of this exercise is to select a through route for hazardous materials carriers bound for Route 50 from points south. The route selected will be the one presenting the smallest hazardous materials safety risk to area residents.

The regional highway system offers several opportunities to bypass population centers. In many instances, current trucking practices are already avoiding densely populated areas. However, food and lodging available within Washington, D.C., may be the cause of some of the hazardous materials trucks that have been observed passing through populated areas; other drivers may believe the more circuitous highway routes have higher time costs.

Identify Alternative Routes

Discussions with the District Department of Transportation and inspection of regional road maps led to the selection of the four alternative routes identified in Figure 4. Route 50 may be reached from the south via four major highway routes:

- I-495 (Beltway) to Route 50 (Alternative 1);
- I-495 to I-295 to Route 50 (Alternative 2);

FIGURE 4: MAJOR HIGHWAY ROUTES FROM SOUTH OF WASHINGTON

- I-395 (Shirley Highway) to I-295 to Route 50 (Alternative 3); and

- I-395 to Route 50 (Alternative 4).

The last routing alternative takes trucks through downtown Washington past the Capitol Hill area. The other three alternatives are primarily interstate routes until they meet Route 50 (well outside downtown). The total travel distances of the alternatives are relatively similar, and the routes were judged to be reasonable substitutes for one another.

Identify Mandatory Routing Variables

There are no physical restrictions on hazardous materials movements on the interstates or Route 50. The District recently enacted an ordinance which prohibits hazardous cargoes from entering the highway tunnel under the Mall near the U.S. Capitol. However, this fact does not preclude evaluation of Alternative 4, as the analysis will determine which of these routes poses the smallest overall risk. Although the District has chosen to apply one criterion in designating its hazardous cargo route, the case study aims to evaluate the alternatives without precluding any options on the basis of an existing routing ordinance.

Segment Routes

The alternative routes were segmented on the basis of ADT and census tract boundaries as illustrated in Figure 5. This decision was made after contacts with State and local transportation agencies revealed that it would not be possible to obtain historical accident rate data for all roadway segments.*

The routes were segmented on the basis of classification schemes used by the DOTs of Virginia, Maryland, and the District to measure traffic volumes. Simultaneously, census tract maps were consulted in order to choose segment breakpoints which would allow uniform calculations of the accident probabilities and consequence values for the same stretch of roadway. The other segmenting criteria was roadway type. A route was segmented at the point where the roadway type changed from interstate to urban arterial.

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*Accident rate data were available on most segments of the interstates. However, the predictive models were used for the case study in order to assess their usefulness. In general, the predicted values corresponded well to the actual values.

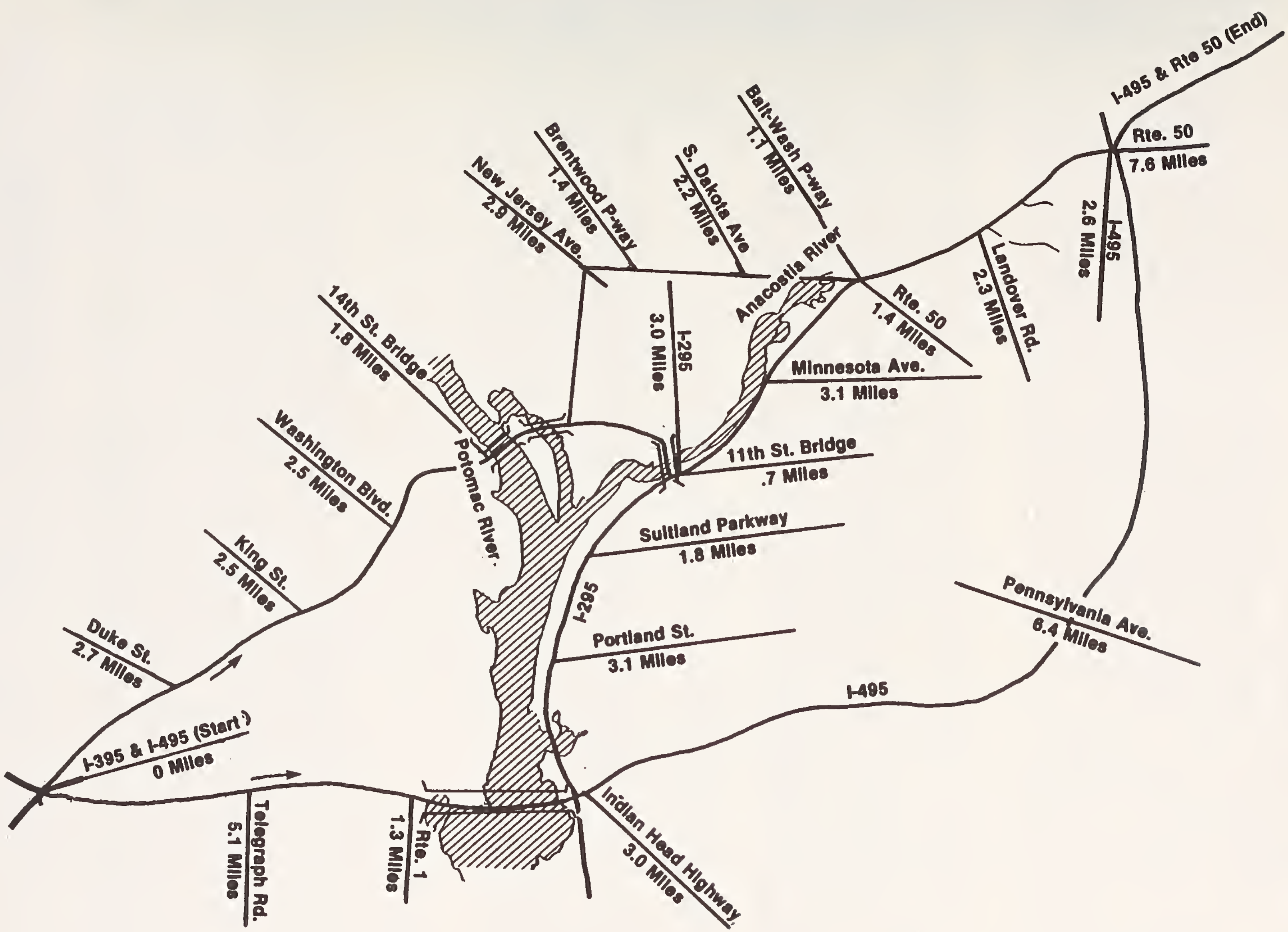

FIGURE 5: ALTERNATIVE ROUTE SEGMENTS

(2) Calculate Accident Rates

Calculations for both interstate and urban arterial segments were made using the default models described earlier. Data for the models were compiled by contacting State and city agencies as well as by on-site inspections of the alternatives. Tables 10 and 11 present the roadway inventory worksheet and accident rate calculations, respectively, for Alternative 1. The calculations which convert accident rates to probability statements are also presented in Table 11. The accident rates for all segments of Alternative 1 are quite similar, as the whole potential hazardous materials route is an interstate highway.

Calculations for all four alternatives and their corresponding segments are presented in Appendix D, along with the roadway inventory sheets. The models' predictions were reasonable when applied to the other alternatives, and the predicted urban arterial accident rates were about twice as great as the predicted six-lane interstate rates. (The urban arterial in Washington has limited access from South Dakota to the Beltway and, consequently, its rates on these segments are lower than might be expected on urban arterials with uncontrolled access.)

(3) Convert Accident Rates to Probability Statements

The right-hand column in Table 11 contains the probability calculations for each of the segments in Alternative 1. Probabilities are calculated by multiplying the accident rate times the amount of exposure (or segment length) to determine the likelihood of any vehicle being involved in an accident on that segment at any point in time. The probability calculations for the four alternatives are presented in Appendix D and summarized in Figure 6.

SUMMARY

This section documented the study's investigations in the field of accident causation, and the development of a methodology to calculate accident probabilities given certain roadway and traffic information. The methodology is structured to allow planners to use their own local information or, if desired, to use the default parameters and models recommended in the text. The heart of the probability calculation is the accident rate, and it is recommended that observed rates rather than predicted values be used whenever possible. However, if the observed values are unavailable, the recommended predictive models will produce results that are intuitively correct and preserve the three roadway types' relative differences in safety.

The probability values calculated for the interstate segments in the Washington, D.C., case study are quite small and reflect the overall safety of interstate highways. Large differences between most of the segments of

Alternative: 1

Date:

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TABLE 10

WORKSHEET 1: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED ~~OR OBSERVED~~ (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		
I-A	From: I-495& I-395 To: I-495& Telegraph Rd.	I-S	6	Urban	5.0	55	90.5	–	–	–	–	–	–	–	1.515	
I-B	From: Telegraph Rd. To: Rte.1	I-S	6	"	1.3	"	88.8	–	–	–	–	–	–	–	1.499	
I-C	To: Indian Head Hwy.	I-S	6	"	3.0	"	101.0	–	–	–	–	–	–	–	1.614	
I-D	To: Penna. Ave.	I-S	6	"	6.4	"	82.1	–	–	–	–	–	–	–	1.435	
I-E	To: I-495 & Rte. 50	I-S	6	Urban	7.6	55	95.0	–	–	–	–	–	–	–	1.557	

TABLE 11

ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 1

Date

Page 1 of 1

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
6 Lane Interstate (Rural/Suburban)	1-A	Y = .45 + .012 (90.5) = 1.536 acc/mvm	P(acc/v) = 1.536 acc/mvm x 5 (v-m/v) = 7.680 x 10^{-6}
6 Lane Interstate (Rural/Suburban)	1-B	Y = .45 + 0.12 (88.8) = 1.516 acc/mvm	P(acc/v) = 1.516 acc/mvm x 1.3 (v-m/v) = 1.971 x 10^{-6}
6 Lane Interstate (Rural/Suburban)	1-C	Y = .45 + 0.12 (101.0) = 1.662 acc/mvm	P(acc/v) = 1.662 acc/mvm x 3 (v-m/v) = 4.986 x 10^{-6}
6 Lane Interstate (Rural/Suburban)	1-D	Y = .45 + .012 (82.1) = 1.435 acc/mvm	P(acc/v) = 1.435 acc/mvm x 6.4 (v-m/v) = 9.185 x 10^{-6}
6 Lane Interstate (Rural/Suburban)	1-E	Y = .45 + 0.12 (95.0) = 1.590 acc/mvm	P(acc/v) = 1.590 acc/mvm x 7.6 (v-m/v) = 12.084 x 10^{-6}

Legend:

Y = accidents/million vehicle-miles
acc = accident
mvm = million vehicle-miles
v-m = vehicle-miles
v = vehicle
P(acc) = probability of accident

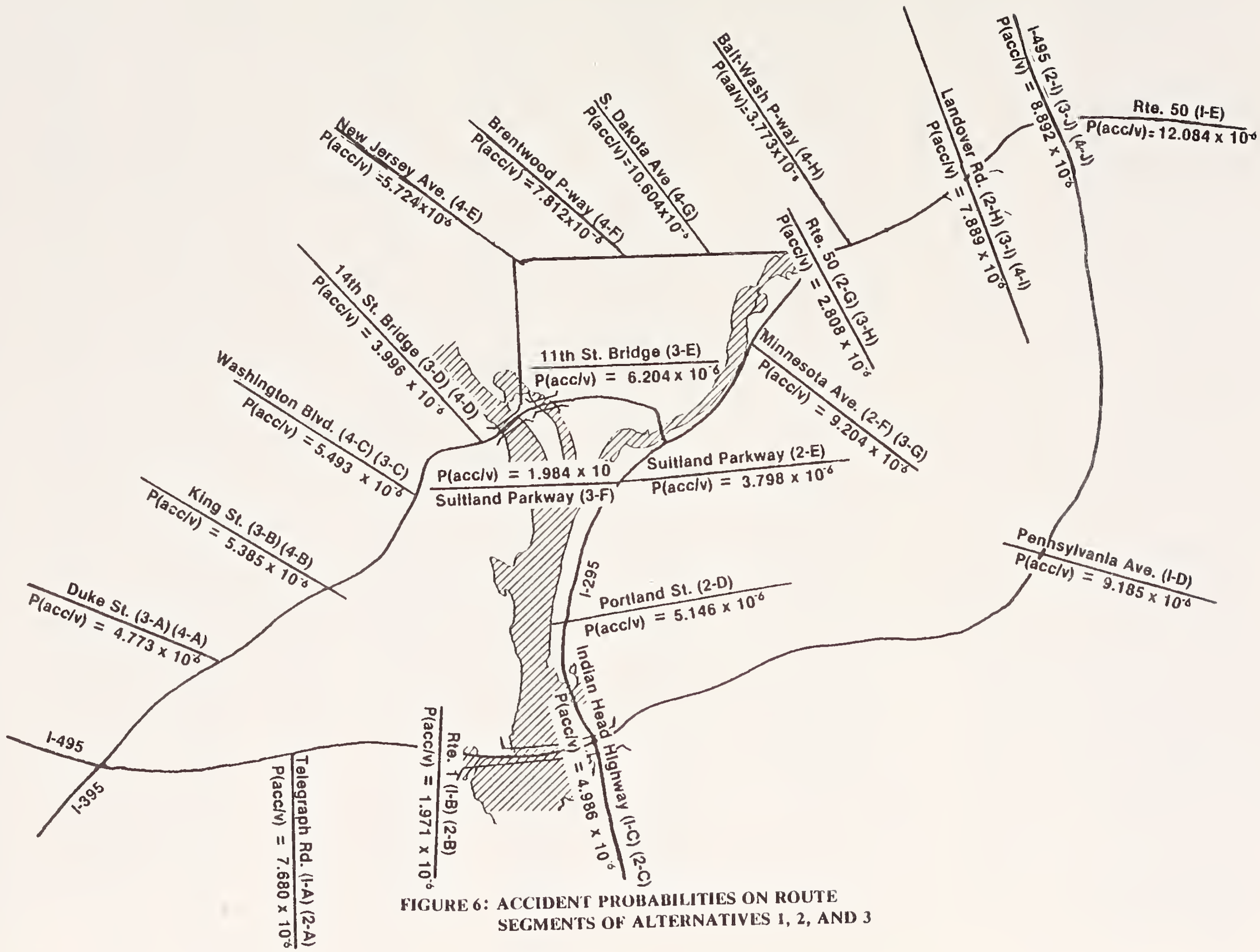

FIGURE 6: ACCIDENT PROBABILITIES ON ROUTE SEGMENTS OF ALTERNATIVES 1, 2, AND 3

the four alternatives were not observed because of the general similarity of the roadways and traffic conditions. High accident probability values in the case study generally reflect greater segment length (or exposure) rather than higher accident frequencies. On the basis of the probability values alone, it is impossible to make any judgements about which route is safer for hazardous materials shipments. A comprehensive analysis of the routing alternatives must include the potential consequences. The following section describes a technique for estimating the potential impacts of a hazardous materials release and applies this methodology to the four routes in the case study.

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31. "Highway Capacity Manual 1965," Highway Research Board, Special Report 87, National Research Council, 1965. Definitions are as follows:

Level terrain - any combination of gradients, length of grade, or horizontal or vertical alignment that permits trucks to maintain speeds that equal or approach the speed of passenger cars.

Rolling terrain - any combination of gradients, length of grade, or horizontal or vertical alignment that causes trucks to reduce their speeds substantially below that of passenger cars on some sections of the highway, but which does not involve sustained crawl speed by trucks for any substantial distance.

Mountainous terrain - any combination of gradients, length of grade, or horizontal or vertical alignment that will cause trucks to operate at crawl speed for considerable distances or at frequent intervals.

32. Roy Jorgensen Associates, Inc.; "Cost and Safety Effectiveness of Highway Design Elements," National Cooperative Highway Research Program Report 197, Transportation Research Board, Washington, D.C., 1978.

33. Snyder, J. C., "Environmental Determinants of Traffic Accidents: An Alternate Model," Transportation Research Record No. 486, 1974.

34. Cribbins, P. D., Arey, J. M., and Donaldson, J. K.; "Effects of Selected Roadway and Operational Characteristics on Accidents on Multilane Highways," Highway Research Record No. 188, 1967.

3. DEVELOPMENT OF A HAZARDOUS MATERIALS CONSEQUENCES ASSESSMENT METHODOLOGY

CONCEPTUAL FRAMEWORK

Developing a methodology to assess the consequences of potential hazardous materials accidents requires an understanding and knowledge of many factors. High on the list of factors would be the type and quantity of hazardous materials carried as well as the specific characteristics of each material. Equally important is a definition of what quantitative factors are to be used as consequence descriptors. Additionally, one would want to have an understanding of how the type and amount of hazardous materials interact with the consequence descriptors. All of these issues are discussed below as they relate to hazardous materials route designation.

The Problem of Lack of Exposure Data

One of the most important findings of this study is that there is no comprehensive source of hazardous materials exposure data at the national level for motor carriers.* This fact was the overriding factor in the development of the consequences methodology. Without "hard" data to suggest what hazardous materials are carried what distances and in what parts of the country, it is difficult to focus on the most likely hazardous materials accident consequences for a particular route.

Without exposure data, in terms of ton-miles per commodity, the study was left with several alternatives. The worst case commodity for all hazardous materials could be used in the analysis but, as this section will indicate, there is no assurance that the worst case commodity is carried uniformly over the entire country. In fact, just the opposite is more likely. Another alternative examined was to seek exposure data at the State level. This search found only one State with exposure data (1).

The last reasonable alternative examined was to analyze the hazardous materials roadway accident data and postulate that accident experience is a surrogate for exposure. Other alternatives, such as conducting surveys and examining ICC data, were outside the scope of this study.

In view of these alternative courses of action, the Materials Transportation Bureau's (MTB's) hazardous materials incidents data base (2) was examined along with selected accidents from the Bureau of Motor Carrier Safety

*This conclusion has been documented by others (4).

(BMCS) data base. The MTB data base contains hazardous materials incidents and accidents that have been reported by the motor carriers on DOT Form F 5800.1 (10-70).* As required by the Code of Federal Regulations, carriers use this form to report incidents by commodity, location, and several other factors. The information is then coded by MTB and analyzed. The accident reports among the total incident reports are coded by MTB as the reports are received from the carriers. The accidents can then be collated by hazardous material class. (See Appendix A for the definition of the respective classes of hazardous materials.) Collation of the MTB records was done nationally for the period July 1973 to December 1978, as summarized in Table 12.

Table 12 indicates that about 90 percent of the accidents involve combustible liquids, flammable liquids, and corrosives. Intuitively this seems correct because many of the materials in these classes are commonly used in industry and by consumers (see column 4 of Table 12). This relationship was also supported when the accident experience was compared with the previously mentioned State survey data.

Table 13 compares the MTB accident experience for the Commonwealth of Virginia to a survey of vehicles carrying hazardous materials on Virginia highways (1). For the most frequently carried classes of hazardous materials--combustible liquids, flammable liquids and corrosives--the accident experience and survey results are very similar. Without the benefit of other State surveys, it is difficult to give statistical validity to the hypothesis that the accident data are a valid surrogate for exposure. However, at the same time, and without other means to identify the type, distances, and location of the carriage of hazardous materials, the MTB data appear to be the best available default parameter for identifying what materials are being carried in a particular area.

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*The MTB requires that any interstate carrier (common, contract, or private) of hazardous materials in sufficient quantity to warrant placarding file DOT Form 5800.1 in the event of any incident or accident that results in the release of hazardous materials. The BMCS requires all interstate carriers (except private carriers of farm-to-market produce and postal carriers with vehicles having a gross vehicle weight rating of 10,000 pounds or less) to report accidents that result in death, injury, or $2,000 or more in damages (5). An incident is defined as any occurrence which results in the unintentional release of hazardous material. An accident is an incident which occurs on a roadway and involves vehicular transport of the hazardous material.

TABLE 12
DISTRIBUTION OF HIGHWAY ACCIDENTS INVOLVING HAZARDOUS MATERIALS, BY CLASS AND COMMODITY

H.M. Class	Number of Accidents	Percent* of Total	H.M. Commodity	Number of Accidents	Percent* of H.M. Class	Percent* of Total
			Asphalt Cutback	12	3.5	0.6
			Combust Liq. N.O.S.	88	25.7	4.2
			Crude Oil Petrol	6	1.8	0.3
			Fuel Oil	119	34.8	5.7
Combustible Liquids	342	16.3	Fuel Oil 1, 2, 4, 5	95	27.8	4.5
			Kerosene	9	2.6	0.4
			Oil N.O.S. Petrol C.L.	4	1.2	0.2
			Petrol Distill C.L.	2	0.6	0.1
			Solvent N.O.S. C.L.	2	0.6	0.1
			Other	5	1.5	0.2
			Actetone	12	0.9	0.6
			Alcohol N.O.S.	18	1.4	0.9
			Cement Liquid N.O.S.	11	0.9	0.5
			Comp Paint Remove F	22	1.7	1.0
			Crude Oil Petrol	90	7.1	4.3
Flammable Liquids	1,272	60.5	Flam Liq. N.O.S.	52	4.1	2.5
			Fuel Aviation Turbn	20	1.6	1.0
			Gasoline	818	64.3	38.9
			Motor Fuel N.O.S.	27	2.1	1.3
			Oil N.O.S.	22	1.7	1.0
			Paint, Enamel, Law., Stain	50	3.9	2.4
			Other	130	10.2	6.2
			Flammable Solids N.O.S.	3	42.9	0.1
Flammable Solid	7	0.3	Phosphorus Pentasul	2	28.6	0.1
			Smokeless Power 100	1	14.3	0.0
			Sodium Hydrosulfite	1	14.3	0.0
			Ammonium Nitrate	5	11.4	0.2
			Ammon. Nitr. Fert	6	13.6	0.3
Oxidizer	44	2.1	Amon. Nitr. Mix Fert	5	11.4	0.2
			Ca Hypochlorite Mix	5	11.4	0.2
			Chromic Acid	2	4.5	0.1
			Nitro Carb Nitrate	10	22.7	0.5
			OX_1 Material N.O.S.	3	6.8	0.1
			Other	8	18.2	0.4
			Anhydrous Ammonis	17	42.5	0.8
			CO2 Liquified	4	10.0	0.2
Nonflammable Compressed Gas	40	1.9	Compr Gas N.O.S., NFG	3	7.5	0.1
			Helium	9	22.5	0.4
			Oxygen	2	5.0	0.1
			Other	5	12.5	0.2
			Compr. Gases N.O.S. FG	5	7.4	0.2
Flammable Compressed Gas	68	3.2	Hydrogen	8	11.8	0.4
			Liq. Petrol Gas	50	73.5	2.4
			Other	5	7.4	0.2
			Comp TR & WD Killer	3	6.8	0.1
			Sodium Cyanide Solut	3	6.8	0.1
			Dinitrophenol Solut	4	9.1	0.2
Poison (Liq. or Solid)	44	2.1	Insecticide Dry	2	4.5	0.1
			Insecticide Liquid	2	4.5	0.1
			Organic Phosphate MD	5	11.4	0.2
			Poisonous Liqs N.O.S. A, B,	11	25.0	0.5
			Poisonous Solids N.O.S.	4	9.1	0.2
			Other	10	22.7	0.5

TABLE 12 (Continued)

H.M. Class	Number of Accidents	Percent* of Total	H.M. Commodity	Number of Accidents	Percent* of H.M. Class	Percent* of Total
			Fissile R.A.M.	1	9.1	0.0
Radioactive Material	11	0.5	R.A.M. Low Spec. Act	5	45.5	0.2
			R.A.M. N.O.S.	5	45.5	0.2
			Ammo - Cannon Explo	2	6.5	0.1
			Blst Caps > 1000	2	6.5	0.1
			Boosters Explosives	2	6.5	0.1
			Explosive Bomb	2	6.5	0.1
Explosives	31	1.5	Explosives Class A	2	6.5	0.1
			Explo Projectiles	2	6.5	0.1
			High Explosives	5	16.1	0.2
			Propellant Class B S	4	12.9	0.?
			Small Arms Ammo	3	9.7	0.1
			Other	7	22.6	0 3
			Acid Liquid N.O.S.	5	2.0	0.2
			Batts Stor Wet	17	6.9	0.8
			Caustic Soda Liq & Dry	16	6.5	0.8
			Comp Cleaning Liq C	20	8.2	1.0
			Corr Liq N.O.S.	34	13.9	1.6
Corrosives	245	11.6	Elect Balt Fluid	11	4.5	0.5
			Hydrochloric Acid	31	12.7	1.5
			Phosphoric Acid	6	2.4	0.3
			Sodium Hydroxide LQ	13	5.3	0.6
			Sulfuric Acid	38	15.5	1.8
			Other	54	22.0	2.6
TOTAL	2,104					

* Percent rounded to nearest tenth of a percent.

NOTE

A commodity is listed if:

1) more than one accident was reported during the 5-year period; or

2) no more than 10 commodities within a class had more than one accident. For classes with more than 10 commodities meeting this criterion, only the top 10 were reported.

3) Exception: 1) All flammable solid accidents were reported as there were so few in class.

2) All radioactive material accidents reported.

TABLE 13

HAZARDOUS MATERIALS ACTIVITY IN VIRGINIA

H.M. CLASS	MTB ACCIDENT RECORDS* (7/73 - 12/78)		VA DEPARTMENT OF TRANSPORTATION SAFETY "SURVEY" (8/77)	
	Number of Accidents	Percent of Total	Number of Vehicles	Percent of Total
Combustible Liquid	13	24.1%	174	24.8%
Flammable Liquid	31	57.4	303	43.3
Flammable Solid	0	0.0	10	1.4
Oxidizer	0	0.0	12	1.7
Nonflammable Gas	0	0.0	42	6.0
Flammable Gas	2	3.7	52	7.4
Poison	1	1.9	13	1.9
Radioactive Materials	0	0.0	1	.1
Explosive	1	1.9	15	2.1
Corrosive	5	9.3	79	11.3
TOTAL	54	100%	701	100%

*Not updated by BMCS data.

SOURCE: (1), (2)

Table 14 indicates that the MTB data base in Appendix B can be stratified by State. A more detailed examination of Appendix B indicates that the data can also be stratified by city, but the accident frequency becomes so small that it may be misleading to do so.

Panel Member's Viewpoint

Before the MTB data were available for the project, a panel of professionals (see Section 2) likely to use this research product were asked to define the type of exposure data they would require to make hazardous materials routing decisions. The most significant finding was that there was no consensus among them. For example, some members felt they would require exposure information for all hazardous materials and then plan for the worst case. Others considered it adequate to plan for some type of most probable average. Still others felt that hazardous materials consequences were not really any more of a problem than other existing safety problems and preferred to deal with a single hazardous materials consequences factor. Taken collectively, these viewpoints suggest the need for a hazardous materials consequences assessment methodology flexible enough to accommodate this spectrum of perceived needs. As will be seen later in this section regarding the analysis of the MTB data, this data base, when supplemented with certain additional information, meets all the requirements set forth by the panel.

Population and Property Exposure

On the other hand, the panel did agree that for most practical purposes the primary consequence descriptors should be population and costs associated with the potential loss of property both on and off the right-of-way. The relative importance of population and property was determined by having the panel examine the seven classes of hazardous materials indicated in Table 15. Each of the seven classes was evaluated individually based on the potential threat it poses to people as compared with property or the environment. The purpose of this ranking was to determine: (1) if some classes of materials posed special threats to one or more of the three general receptor categories, and (2) the relative importance of the receptor categories. The factors that would suffer the consequences were divided into:

- population density;
- special populations (e.g., schools, hospitals);
- volume of motorists (ADT);

TABLE 14

HAZARDOUS MATERIALS ACCIDENT RECORDS IN THREE STATES

(July 1973 - December 1978)

H.M. Class	VIRGINIA		ALABAMA		KANSAS	
	Number of Accidents	Percent of Total	Number of Accidents	Percent of Total	Number of Accidents	Percent of Total
Combustible Liquid	13	24.1%	15	31.9%	7	20.6%
Flammable Liquid	31	57.4	23	48.9	20	58.8
Flammable Solid	0	0.0	0	0.0	0	0.0
Oxidizer	0	0.0	1	2.1	1	2.9
Nonflammable Gas	0	0.0	0	0.0	1	2.9
Flammable Gas	2	3.7	0	0.0	1	2.9
Poison	1	1.9	4	8.5	2	5.9
Radioactive Materials	0	0.0	0	0.0	0	0.0
Explosive	1	1.9	0	0.0	0	0.0
Corrosive	5	9.3%	4	8.5%	2	5.9%
TOTAL	54	100%	47	100%	34	100%

SOURCE: (2)

TABLE 15

HAZARDOUS MATERIALS CLASSES FOR PANEL RANKING

HAZARDOUS MATERIAL CLASS
EXPLOSIVES
COMPRESSED GASES
FLAMMABLE, COMBUSTIBLE & PYROPHORIC LIQUIDS
POISONOUS MATERIALS & ETIOLOGIC AGENTS
RADIOACTIVE MATERIALS
FLAMMABLE SOLIDS, OXIDIZERS & ORGANIC PEROXIDES
CORROSIVE MATERIALS

- bridges, ramps, and other roadway structures;

- public and private buildings and infrastructure (power lines, communication lines); and

- environmentally sensitive areas (reservoirs, waterways).

Panelists ranked the above categories according to which would be most adversely affected by an accidential release of each of the seven classes of hazardous materials.

People were consistently rated over the environment and property as most likely to suffer the worst consequences of any hazardous material release. Table 16 presents the distribution of receptor factors with respect to the severity of potential consequences from each class of hazardous materials. Summing the rating points across all classes produced the following factor ranks, in order of importance: population density, special populations, volume of motorists, environment, buildings, and bridges and ramps.

The relatively tight cluster of factors for corrosive and flammable solids supports the belief that control and dispersion are the major hazardous materials considerations. Because these two classes are less likely to endanger as large an area as quickly, panel members apparently felt that measures could be taken to safeguard people; property destruction therefore became an important segment of the overall threat. Materials like radioactives and compressed gases, which cannot be readily controlled, posed such major threats to people that property damage for these hazardous materials classes was much less significant by comparison.

Two major findings emerged from the ranking. First, in considering hazardous materials routes, the most important criterion is people. (There was some disagreement as regards special populations versus motorists. The unresolved question was whether more motorists should be endangered to protect a school or hospital, or whether all persons should be counted equally.) Second, the relatively uniform ranking across all classes (i.e., factors A, B, and C were always selected over D, E, and F--except for corrosives) implies that from a routing consequences perspective, all hazardous materials may be considered as one class. Other findings included the opinion that motor carrier costs should be included as part of the consequences and that great detail in measuring the consequences was probably not practical for this type of analysis.

TABLE 16

HAZARDOUS MATERIALS ACCIDENT CONSEQUENCES

The points plotted below represent 6 factors (identified by capital letters) which are susceptible to damage in the event of an accidental hazardous material release. The highest values have been assigned to those factors which will potentially suffer the greatest damage.

A - Population density

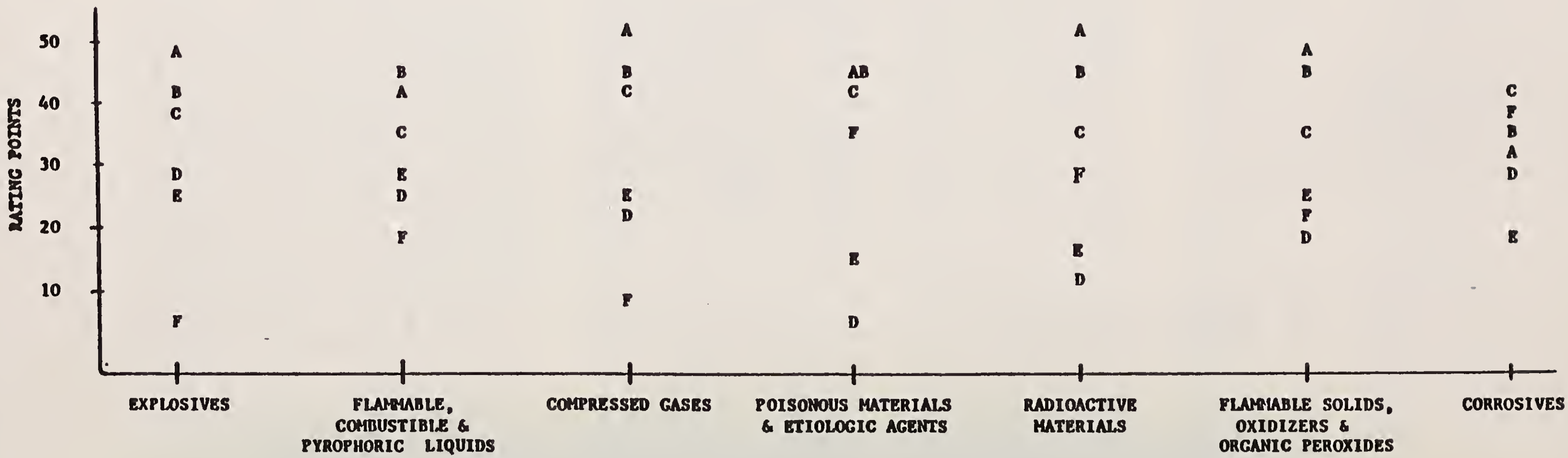
B - 'Special' populations (e.g., schools, hospitals)

C - Volume of motorists (ADT)

D - Bridges, ramps and other roadway structures

E - Public and private buildings and infrastructure (power lines, communication lines)

F - Environmentally sensitive areas (reservoirs, waterways)



Analysis of the MTB and BMCS Data Bases

Determining the magnitude of the consequences of a potential hazardous materials accident along a route is a function of many factors. The types of materials likely to be carried were indicated above, and the MTB data base in Appendix B shows where these accidents have taken place. Ideally, it would be desirable to determine the accident consequences as a function of the roadway factors identified in Section 2. However, this type of information is not a required part of the hazardous materials accident reporting procedures. Given that it is not possible to relate these accidents directly to consequences, an attempt was made to approach the problem from the perspective of the severity of accidents as a function of class of material, accident type, and varying quantities of materials spilled.

It was possible to determine potential accident impact by class of material in terms of distances likely to be affected by the respective materials. This aspect is fully developed in the Range of Potential Hazardous Materials Impact section. However, the study of accident types and quantities spilled was less successful. If "type" in accident type is defined as spillage, explosion, or leakage with or without fire, then the data bases examined offer no help in differentiating between accidents because this information is not collected on MTB accident forms. If accident type is defined as head-on, side-swipe, rear-end accidents, etc., it is possible to develop this information, but it is of little value because the quantity spilled relationship is not meaningful. From a consequences perspective, it may be useful to know the number of different accident types because rear-end collisions may spill more (or less) than side-swipe accidents. From this, one could hypothesize that more spillage results in greater consequences. However, as will be seen below, there is no relationship between quantity of spill and accident cost; therefore, knowing accident type from a consequences estimating perspective is not useful.

The study next hypothesized that it may be possible to develop an accident severity measure as a function of quantity of material spilled. The original concept was to develop three severity distances for each class of hazardous materials. The immediate distance would be the area of total destruction nearest the spill. The intermediate distance would extend from the immediate bound to the far bound and would consist of consequences to property defined as "heavily damaged." The far distance would extend from the intermediate bound to a distance of no damage and would have consequences to property classified as "moderate to light" damage. Conceptually, this approach could apply to population as well where the immediate distance would expose population to death, the intermediate distance to disabling injuries, and the far distance to discomfort, evacuation, or minor injuries. Unfortunately, it was not possible to establish this type of relationship, as seen in Figure 7.

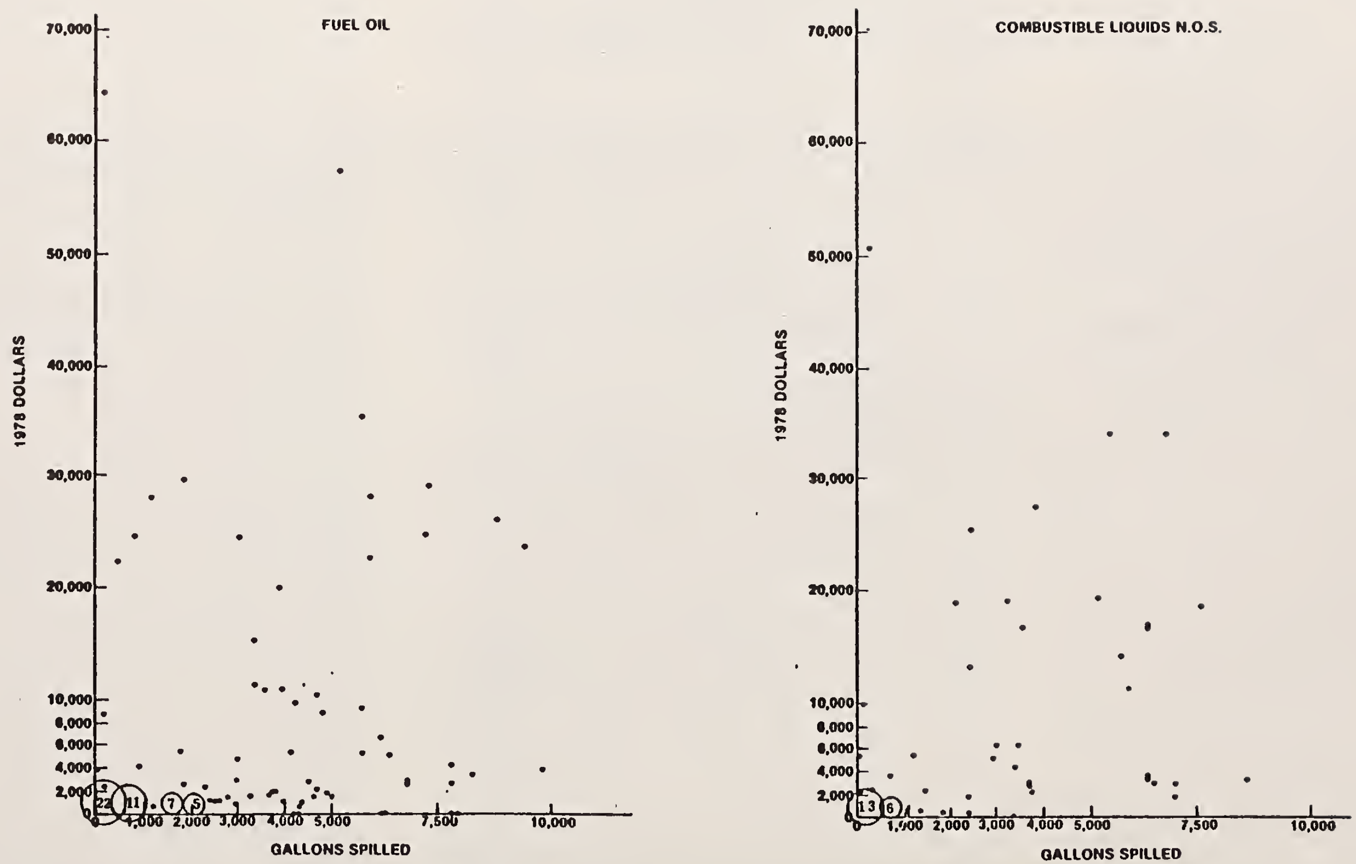


FIGURE 7: QUANTITY OF HAZARDOUS MATERIALS SPILLED VERSUS DAMAGES INCURRED AS A RESULT OF THE SPILL (MTB)

Figure 7 and Appendix C are plots of amount of materials spilled from hazardous materials accidents versus constant dollar costs of the accidents. As these plots clearly indicate, there is no apparent relationship between the amount spilled at an accident site and the costs or consequences of the accident. For example, Figure 7 shows that a 100-gallon fuel oil spill can have consequences as small as $100 or as great as $65,000. And a 6,000-gallon fuel oil accident can have consequences of less than $100 or more than $58,000. Similar comparisons can be made for the other materials plotted. The lack of relationship between amount spilled and consequence in cost , and the inability to relate the amount spilled as a result of a hazardous materials accident to the impact area, gave birth to the concept of measuring property and population exposed rather than quantifying potentials for property destroyed and people killed and injured. This concept will be fully developed below.

ESTIMATING THE POTENTIAL CONSEQUENCES OF HAZARDOUS MATERIAL RELEASES ON HIGHWAYS

As described in Section 2, calculating the risks associated with transporting hazardous materials on alternative highway routes requires two inputs: accident probabilities, and estimates of the potential consequences on nearby populations and environments. The consequences component of the risk equation is primarily a measure of population along the route. This reflects the panel's consensus that the hazardous material releases pose the greatest hazard to human life and then to property. The methodology uses census tract maps and data to estimate the number of persons potentially affected along a hazardous materials route. An implicit assumption in this approach is that residential populations accurately represent potential human exposure to hazardous material releases. This assumption does not consider the effects of time of day or the movement of commuters from home to work place; however, these limitations were judged less severe than the complexities of an analysis which did account for travel behavior and, if desired, such analyses could be undertaken with this methodology.

Other factors in the consequences component include the location of special populations (e.g., schools, hospitals, etc.), the value of private property along the roadway, and the value of nearby public property including roadway structures. These factors need not be treated in a quantitative manner, like population, but may be used as qualitative influences to subjectively prioritize alternatives that show no clear-cut differences according to their population risk values. (These factors can be treated quantitatively by estimating the value of the various properties and structures. The data requirements for this exercise are prohibitive, however, and it is not clear

that the expense is warranted in light of the secondary importance of property as a consequence factor and the fact that the degree to which the property would be destroyed is unknown.)

Range of Potential Hazardous Materials Impacts

The potential effects of a hazardous material release depend on the type and amount of the commodity spilled and the environment in which it spills. Due to the wide variation in chemical properties of hazardous materials, the different commodities were grouped by placard class and a potential impact area assigned to each hazardous materials placard class on the basis of the recommended evacuation distance in the Hazardous Materials Emergency Response Guide currently being prepared for the USDOT (3). Essentially, the guide recommends minimum safe evacuation distances for commodities likely to be poisonous, corrosive, explosive, etc. Table 17 presents the potential impact area by hazardous materials placard class. The impact area for each class represents the recommended evacuation distance for that commodity within the class with the largest evacuation distance. Only commodities which had been in vehicular accidents between July 1973 and December 1978 (and were reported to MTB) were considered.

The study approach is based on the worst case commodity for each class. This was a subjective decision which uses the most conservative (or worst case) situation for planning purposes. In some instances, the worst case may not be representative of the commodities most commonly transported within that class. The methodology permits the analyst to substitute his own values for the impact distances or use recommended evacuation distances for commodities that more accurately reflect hazardous materials movements within his area.

Estimating Population Within the Potential Impact Area

The primary measure for estimating potential consequences is population. To estimate the potentially exposed population along a hazardous materials route for a specific hazardous materials class, the class impact distances on both sides of the right-of-way are delineated on census maps and that share of the total tract population falling within the impact zone is recorded. This procedure is detailed below.

(1) Compile Census Tract Maps, Identify Routes, and Mark Off Zone of Impacts

Census tract maps show tract boundaries in an SMSA and are available from the Department of Commerce, Bureau of the Census. As only the boundaries of the census tracts are shown on these maps, it may be necessary to draw in portions of the alternative hazardous materials routes. (See Figure 8 for example of a tract map.)

TABLE 17

POTENTIAL IMPACT AREA BY HAZARDOUS MATERIALS PLACARD CLASS

H.M. CLASS	IMPACT AREA
Combustible Liquid	0.5 mi. (0.8 km) all directions
Flammable Liquid	0.5 mi. (0.8 km) all directions
Flammable Solid	0.5 mi. (0.8 km) all directions
Oxidizer	0.5 mi. (0.8 km) all directions
Nonflammable Compressed Gas	Downwind 1.3 mi. (2.1 km) wide x 2 mi. (3.2 km) long
Flammable Compressed Gas	0.5 mi. (0.8 km) all directions
Poison	Downwind 0.2 mi. (0.3 km) wide x 0.3 mi. (0.5 km) long
Explosives	0.5 mi (0.8 km) all directions
Corrosive	Downwind 0.5 mi. (0.8 km) long x 0.7 mi. (1.1 km) wide

Note: Radioactive Materials were not included in this chart due to a lack of information on the potential impact area.

Source: (3)

After the alternative routes are identified, the zone of potential impacts is delineated on the tract maps. For each pertinent hazardous materials class there is an associated impact distance, and this value is scaled to the map and marked off on both sides of the route. The resultant impact zone is a corridor described by two parallel lines on each side of the route, as illustrated in Figure 8, for flammable liquids.

(2) Measure Share of Census Tract Which Falls Within Impact Zone

With the exception of tracts lying wholly within the impact zone, it is necessary to measure or estimate the share of a tract that falls within the impact zone boundaries. After estimating the share (or percentage) of the tract within the zone, this percentage is multiplied by the total tract population to estimate the number of people in that tract living within the potential impact area. This approach assumes that the population within each census tract is evenly distributed--an assumption that can be refined with local knowledge.

There are two methods to determine what percentage of a tract lies within the impact zone boundaries: (1) estimate, and (2) measure. The level of precision desired for the alternatives analysis will indicate which technique is appropriate. Measurements may be made with a planimeter, a small drafting instrument that measures surface area from maps.

The percentage of tract lying within the impact zone is recorded in column 4 of Worksheet 2 (Table 18). Note that each road segment will typically contain several tracts, and it will be much easier to associate discrete tracts and road segments if the routes were originally segmented with the tract boundaries in mind. (This issue was discussed in Section 2 in the subsection "Identify Alternatives and Segment Routes.")

(3) Look Up Tract Populations and Determine Share of Tract Population in Impact Zone

Population from each tract is found in the U.S. Census and recorded on Worksheet 2 in column 3. The product of columns 3 and 4 produces the impact area population for each tract (column 5). Summing across all tract population shares for a segment gives the total segment population in the potential impact area.

(4) Record Locations of Special Populations (Optional)

This part of the process relies on subjective judgments regarding which populations or special groups should receive added weight in the evaluation

FIGURE 8: CENSUS TRACT MAP AND HAZARDOUS MATERIALS IMPACT ZONE

Alternative: ____________

TABLE 18

WORKSHEET 2: POPULATION INVENTORY

Date: ____________

H.M. Class: ____________

Page__of______

Impact Radius:__________

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	

criteria. This study does not recommend any particular group or institution but merely acknowledges that some communities may wish to include this factor in their analysis.

Two obvious candidates for the special groups category are schools and hospitals. The USGS maps identify the locations of these facilities; persons familiar with the area will, of course, also possess this knowledge. Column 6 on Worksheet 2 has been provided to record these items. The enumeration of special populations is not directly used in the risk calculations but may be useful as an alternatives tie-breaker or to provide a more comprehensive picture of the impact area.

(5) Inventory Property on a Hazardous Materials Route

In addition to personal liability, hazardous material releases threaten structures on or adjacent to the right-of-way. Structures include public property such as bridges and overpasses, as well as private property such as homes and commercial developments. The level of sophistication of the property inventory depends on the amount of resources a community chooses to allocate for this part of the analysis. Property inventory techniques range from simple enumerations from secondary data sources (like the special populations inventory) to quantitative estimates that may be used in property risk calculations. When choosing the appropriate technique, the analyst must trade-off varying levels of precision with the costs of achieving that precision and the importance of the property component in the overall alternatives analysis. The technique chosen to inventory property should reflect the criteria and criteria weights that will ultimately be used in the alternatives analysis. Some communities may regard population risk as the overriding measure of importance and treat property risk as merely an ancillary rather than decisive factor. Other communities may feel that property measures should be quantified as much as possible to ensure an objective and uniformly applied alternatives analysis.

Only structures on the roadway (e.g., bridges and overpasses) and the lineal frontage of buildings adjacent to the roadway are measured in the property inventory. Unlike the population inventory, in which impacts are estimated for an area, the study confines estimates of potential property damage to the right-of-way and its immediate environs. This approach was adopted largely because of a lack of historical data for developing impact radii for potential hazardous materials property damage. Also, for materials like combustibles and explosives, much of the property damage is likely to be concentrated on the adjacent buildings, which in turn act as buffers for the ones behind them. Therefore, the conceptualized potential range of impacts for property is in one dimension rather than two. A paucity of data also

precludes differentiating potential impacts between the hazardous materials classes in any more than a cursory fashion; the hazardous materials classes have thus been grouped for the property impact inventory.*

The following discussion presents three techniques for measuring the types and amount of property along a hazardous materials route. The techniques are presented in ascending order of sophistication (and cost), and the third technique will enable the analyst to develop numerical property values that can be used in property risk calculations.

The easiest method for determining the types and amounts of property along the hazardous materials route is to measure the lineal frontage of the various land uses from land-use maps. Worksheet 3 (Table 19) stratifies land-use types into the following five categories:

- low-density residential;
- medium-density residential;
- high-density residential;
- commercial;
- industrial; and
- public.

Land-use maps--usually available from city, county, or regional planning agencies--can be used to obtain this information. Roadway structures may be inventoried with the aid of highly detailed road maps, traffic engineering maps from local or State transportation departments, or aerial photographs.

The second level of roadway inventory would be field data collection to validate and refine the measurements made from the land-use maps. In this exercise, the analyst would travel along each alternative route and measure, by means of odometer readings, the length of each property type developed

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*Some communities may have the necessary information to measure the impact area along two dimensions. For example, a munitions plant shipping truckloads of explosives may know the radius of property impacts in the event of an explosion. With this knowledge, the methodology described above in population impacts can be adapted to property impacts, and the data collection techniques described below modified accordingly.

TABLE 19

WORKSHEET 3: PROPERTY INVENTORY

Alternative: ____________

Date: ____________

Page ___ of ___

H.M. Class: ____________

Impact Radius: ____________

SEGMENT		LAND USE (miles fronting roadway)						NUMBER OF ROADWAY STRUCTURES		SPECIAL PROPERTIES
#	O/D	HI-DENSITY RESID.	MD-DENSITY RESID.	LOW-DENSITY RESID.	PUBLIC	COMMERCIAL	INDUSTRIAL	BRIDGE	OVERPASS	

and actually fronting the roadway. This procedure provides a more realistic measure of what will actually be exposed, compared with the land-use maps which often do not identify individual properties (or their proximity to the road) within the areas designated commercial, industrial, residential, etc. Field observations of the roadway structures may also provide a better picture of the size and nature of bridges, overpasses, cloverleafs, etc.

The third inventory technique builds upon the previous two and is designed to generate estimates of the dollar values for the property located along the route. While in the field, observations are made of specific, representative properties within each land-use type. These properties are then located in the tax assessor's records, and an assessed value per linear foot of frontage is computed. The dollar per running foot value for each land-use type is then multiplied by the corresponding amount of actual land use observed along the route. Similarly, bridge and overpass structure values are obtained from the State highway department, and the total value of these structures is computed. Although this technique is admittedly crude, any biases introduced are uniform across all routes, and the relative (rather than the absolute) values should be consistent for the risk computations.

CONSEQUENCE METHODOLOGY APPLIED TO WASHINGTON, D.C., CASE STUDY

For purposes of the Washington, D.C., case study, the hazardous materials class of flammable liquids was chosen for the impact evaluation. Flammable liquids have a potential impact distance of 0.5 miles (0.8 km) in all directions, and this distance is also applicable for combustible liquids, flammable solids, oxidizers, flammable compressed gas, and explosives. Flammable liquids were also chosen because this class includes gasoline, and the study was concerned with the potential impacts of the most frequently transported commodity. The following discussion presents the steps and findings from applying the impact estimation methodology in Washington. The worksheets used to compile potential impact data on Alternative 1 are presented as examples. The worksheets used for the other alternatives may be found in Appendix E.

(1) Compile Census Tract Maps, Identify Routes and Mark Off Zone of Impacts

Figure 9 identifies the four alternative routes and their associated impact zones delineated on census tract maps. The census tract maps for the

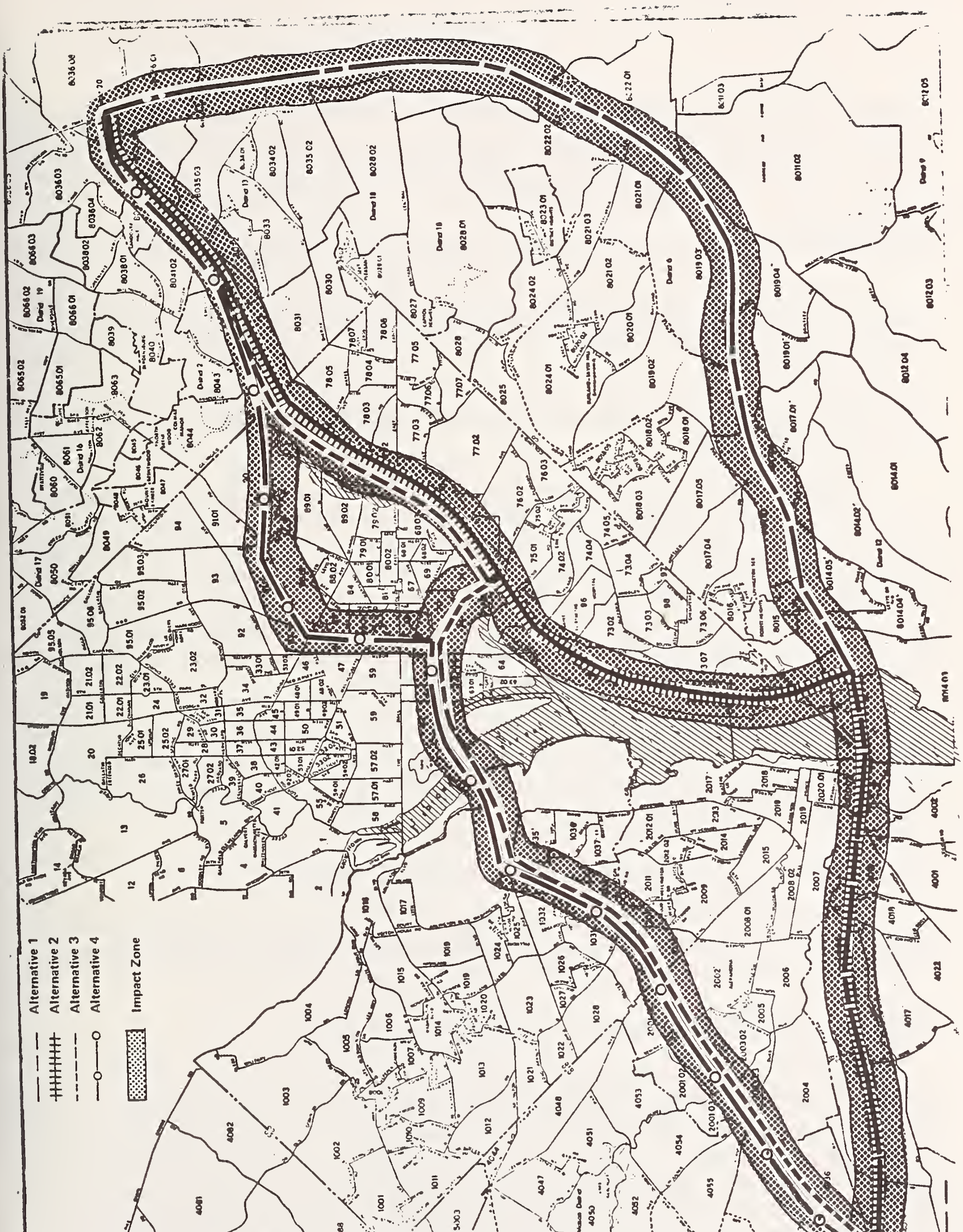

FIGURE 9: ALTERNATIVE ROUTES AND IMPACT ZONES

Washington, D.C., SMSA were obtained from the U.S. Department of Commerce. The parallel lines around each route represent a corridor approximately one mile (1.6 km) wide. This corridor is the sum of the potential impact distances in either direction from the right-of-way.

(2) Measure Share of Census Tract Which Falls Within Impact Zone

The share of each census tract falling within the impact zone was determined by measuring the area with a planimeter. Table 20 presents the worksheets for Alternative 1.

(3) Look Up Tract Populations and Determine Share of Tract Population in Impact Zone

The total population for each census tract within the zone was found in the U.S. Census of Housing and Population and recorded in column 3 of Worksheet 2. Those tracts not wholly within the zone were then multiplied by the percentage factor in column 4 to determine the number of potentially exposed persons in that tract. After values were derived for each tract, all the tracts in each segment were summed to get a population value for the segment. The total segment population is a function of the length of the segment and the nearby residential density.

The results of the population inventory are presented in Figure 10. The route segments correspond to the segments used in the probability calculations, and multiplying the accident probabilities by the population produces risk values for each segment.

(4) Record Locations of Special Populations (Optional)

Only schools were designated "special populations" for purposes of the case study. Some segments of Alternative 1 have large concentrations of schools, and there are 22 schools along the entire route.

(5) Inventory Property on Hazardous Materials Route

The property along the alternative hazardous materials routes was inventoried by using land-use maps and then refining these measures with a "drive-by" inspection. The results of these observations for Alternative 1 are presented in Table 21 on Worksheet 3. The property exposure values developed from the land-use maps are followed in each cell by a number in parentheses. The bracketed value is the amount of property that was visible from the roadway, or generally the amount of development that might experience some damage resulting from a hazardous material release.

TABLE 20

Alternative: 1

WORKSHEET 2: WASHINGTON, D.C.
POPULATION INVENTORY

Date:

H.M. Class: Flammable Liquid

Page 1 of 2

Impact Radius: .5 mile (.8km)

SEGMENT 1 #	O/D	CENSUS TRACTS 2 NUMBER	3 POPULATION	x 4 PERCENT OF TRACT IN IMPACT AREA	= 5 POPULATION IN IMPACT AREA	6 SPECIAL POPULATIONS
1-A	From I-395 and I-495 To Telegraph Rd.	4014	3734	.47	1755	8 schools
		4036	3396	.10	340	
		4015	2689	.81	2178	
		4016	4941	.73	3607	
		4017	4274	.13	556	
	TOTAL	XXXXXXXXX	XXXXXXXX	XXXXXXXXX	8436	
1-B	To Rte. 1	4018	4127	.28	1156	3 schools
		4019	5559	.79	4392	
		2007	1749	.22	385	
		2020.02	3115	.88	2741	
		2017	1292	.11	142	
		4002	4622	.05	231	
	TOTAL	XXXXXXXX	XXXXXXXX	XXXXXXXXX	9047	
1-C	To:Indian Head Hwy.	8014.03	2944	.20	589	1 school
		8014.04	3102	.14	434	
	TOTAL	XXXXXXXXX	XXXXXXXX	XXXXXXXXX	1023	
1-D		8014.05	5139	.49	2518	6 schools
		8015	3585	.36	1291	
		8017.03	10289	.59	6071	
		8014.02	3748	.05	187	
		8017.02	2784	.93	2589	
		8017.01	5976	.05	299	
		8017.05	3742	.05	187	
		8019.02	630	.17	107-	

Alternative: 1

TABLE 20 (Continued)

Date:

H.M. Class: Flammable Liquid

Page 2 of 2

Impact Radius: .5 mile (.8km)

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION X	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
1-D (cont'd)	To Pennsylvania Avenue	8,019.01	6,453	.33	2,129	
		8,019.03	7,089	.43	3,048	
		8,019.04	4,116	.44	1,811	
		8,011.02	6,418	.07	449	
		8,021.01	5,155	.27	1,392	
	TOTAL	XXXXXXXX	XXXXXXXXXX	XXXXXXXXXXX	22,078	
1-E	To: I-495 and Rte. 50	8,022.02	9,789	.19	1,860	4 schools
		8,022.01	669	.43	288	
		ESTIMATED AREA			12,092	
		8,028.02	7,291	.12	875	
		8,035.02	1,653	.24	397	
		8,035.03	7,735	.26	2,011	
		8,036.02	4,487	.31	1,391	
		8,036.01	2,493	.44	1,097	
		8,036.08	5,597	.05	280	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXXXXX	20,291	

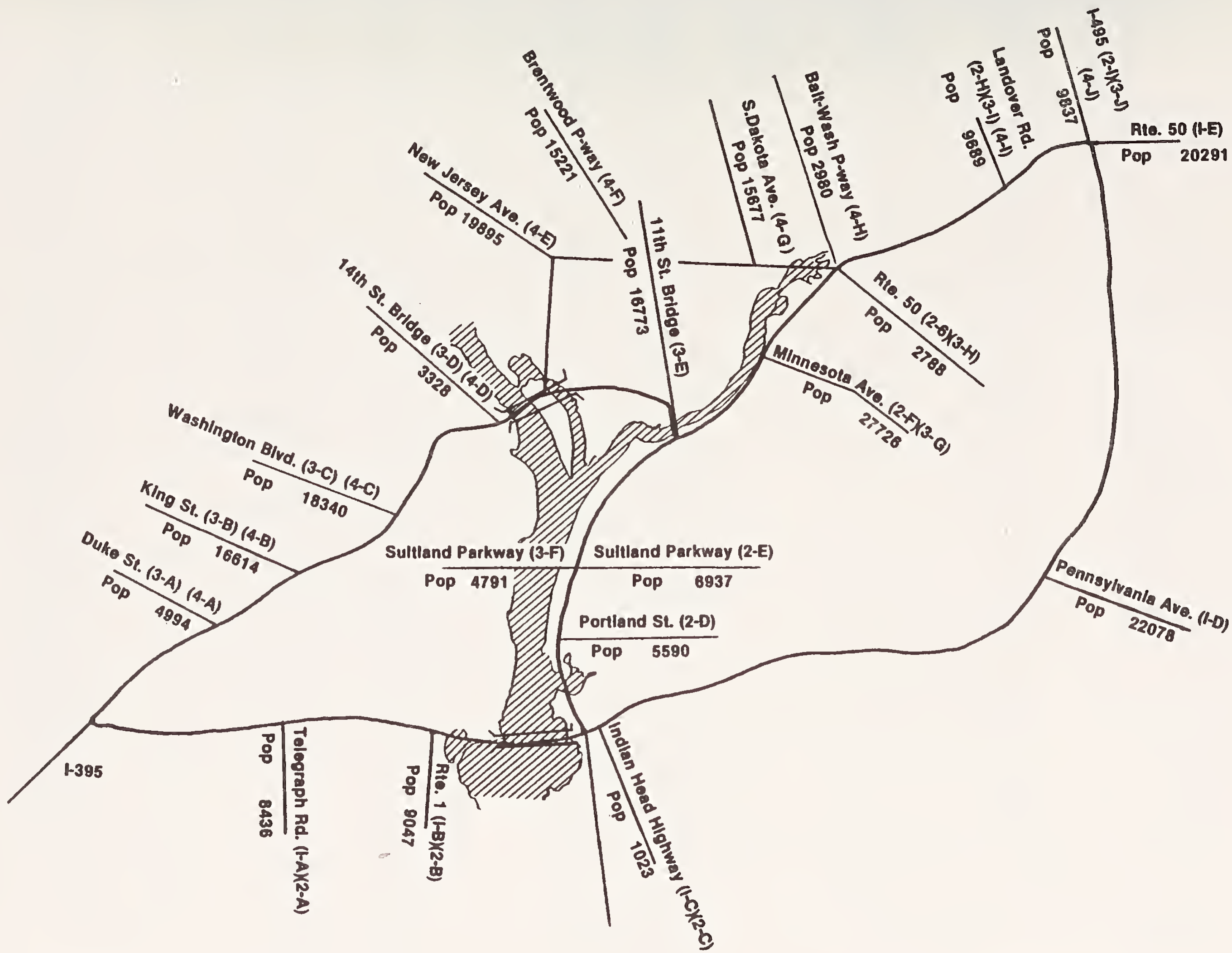

FIGURE 10: POPULATION INVENTORY

TABLE 21

Alternative: 1

Date:

Page 1 of 1

WORKSHEET 3: WASHINGTON, D.C.
PROPERTY INVENTORY

H.M. Class: Flammable Liquid

Impact Radius: .5 mile (.8km)

SEGMENT		LAND USE (miles fronting roadway)						NUMBER OF ROADWAY STRUCTURES		SPECIAL PROPERTIES
#	O/D	HI-DENSITY RESID.	MD-DENSITY RESID.	LOW-DENSITY RESID.	PUBLIC	COMMERCIAL	INDUSTRIAL	BRIDGE	OVERPASS	
1-A			2.1	1.7		0.5(0.4)	2.1	(3)	1	
1-B		0.1	0.8			0.3(0.1)	0.7(0.2)	(1)	(2)	Sewage Treatment Plant
1-C			0.8(0.2)			0.2(0.1)		(1)	(3)	Woodrow Wilson Bridge
1-D		(0.1)	4.5	6.4(0.3)	1.5(1.0)	0.2(0.1)		(2)	(1)	
1-E			5.0	2.3			2.0	(2)	(5)	

Note: Values in parentheses are observations made during a "drive-by" inspection and represent our best judgement as to the land-use type. The other cell entries were developed from land-use maps.

The number of bridges and overpasses along the alternative routes was also recorded. The Woodrow Wilson Bridge across the Potomac River, for example, is a very large structure serving high volumes of traffic which, if interrupted, would have serious ramifications for the regional transportation system. Alternative 3 includes numerous overpasses and bridges around the Pentagon area and, like the Woodrow Wilson Bridge, it would pose serious problems for commuters if the roadway had to be closed.

(6) Inventory Special Property

Alternative 4 would route a hazardous materials carrier past the most significant special property on all of the potential routes--the U.S. Capitol. Alternative 2 exposes the Blue Plains sewage treatment plant. This major waste water treatment facility is situated right next to the roadway and a hazardous materials release of highly explosive materials might result in temporary disruption of service.

SUMMARY

This section presented the methodology for estimating the potential impacts of a hazardous material release on nearby populations and property. Although the impact calculations depend on the class of material transported, several of the classes use the same impact parameters and therefore produce the same consequence values. The methodology uses readily available data and may be performed with varying levels of precision, depending on the level of effort the performing agency wishes to expend.

The population consequence values calculated in the Washington, D.C., case study demonstrate greater variation than the corresponding probability values. This is due to the range of development activities in the metropolitan area which includes the densely populated Shirley Highway corridor and the relatively undeveloped Prince George's County. Section 4 will explain how to combine the probability and consequence values to produce estimates of risk. Subjective criteria which may be used to modify the objective risk calculations will also be discussed in Section 4.

REFERENCES

1. Dennis Price and J.W. Schmidt; "Virginia Highway Hazardous Materials Flow: 1977 Survey," Virginia Polytechnic Institute and State University for the Virginia Department of Transportation Safety, Richmond, Virginia (undated).

2. From a printout (dated October 11, 1979) of the traffic accidents in the MTB data base for the period July 1973 to December 1978.

3. Chemical Propulsion Information Agency, "Hazardous Materials Emergency Response Guide," unpublished draft, prepared for the USDOT Research and Special Programs Administration, prepared at the Johns Hopkins University Applied Physics Laboratory, 1979.

4. Price, Dennis L., "Ten Most Critical Issues in Hazardous Materials Transportation," Report from A3C1O Committee, Transportation Research Board, National Research Council, 1979.

5. Federal Motor Carrier Safety Regulations, U.S. Department of Transportation, Federal Highway Administration, CFR parts 390-397, compilation issued by the American Trucking Association, Washington, D.C., 1979.

4. DEVELOPMENT OF A HAZARDOUS MATERIALS RISK ASSESSMENT METHODOLOGY FOR EVALUATING ALTERNATE ROUTES

OVERVIEW OF RISK ASSESSMENT METHODOLOGY

The risk assessment methodology developed to evaluate alternate routes for transporting hazardous materials over highways consists of three levels of decision making. At the first level, the specific criteria for determining a particular route's applicability are legalistic and mandatory variables. In general, these consist of existing laws, physical roadway limitations, or other factors that may preclude the route's use. The second level involves calculating numeric risk values, as described in Sections 2 and 3. The third and final level is optional; that is, if the numeric risk difference among the candidate routes is too small for making the route selection decision, then other qualitative and quantitative criteria are used. These criteria include: calculating the difference in time and travel costs to the motor carrier; comparing different land uses; evaluating the difference in response capability and proximity of fire and rescue; noting the difference in number of highway structures; identifying special populations such as schools, hospitals, and senior citizen homes; and others. Each of the criteria levels is further discussed below.

CRITERIA FOR DESIGNATING HIGHWAY ROUTES FOR TRANSPORTING HAZARDOUS MATERIALS

The criteria described here should generally be followed in the order presented. This discussion assumes that an agency, group of agencies, or some organization has been designated or has taken the responsibility to perform an analysis of the routes used to transport hazardous materials. The criteria can be used either to establish routes or examine existing routes, by simply omitting certain criteria steps for the latter analysis. Local distribution routes or through routes for hazardous materials can be examined, but the former are much more involved and may take the form of exception routes. That is, for local distribution it may not be possible or practical to designate routes, but it will make more sense to exclude hazardous materials transport from certain routes or certain areas of the city. The criteria are flexible enough to accommodate all local information available, but at the same time provide default data for jurisdictions that may not have the necessary evaluative information. Finally, the criteria are presented in a documentary rather than a users' format so that FHWA will be able to document the research accomplished under this contract. It is anticipated that a companion users' document will be developed for the application of these procedures.

Mandatory Factors

Mandatory Factors, Criterion 1

This criterion level consists of factors pertaining to the physical features of the routes. A determination will have to be made regarding the ability of the route to carry the commodities. Bridge carrying capacity, tunnel and bridge clearance heights, and turning radii are all physical factors that must be investigated. For most major roads these factors will not apply; however, drivers on these routes should be capable of making such determinations, or first-hand observations should be made to ensure that the routes can accommodate vehicles carrying hazardous materials.

Mandatory Factors, Criterion 2

Legal and jurisdictional searches are performed at this level. That is, laws, agreements, ordinances, and other legal instruments are searched at the local, State, regional, or interregional level to determine if they specifically preclude the use of any routes that may be considered in the analysis.* At the local level the usual source of this type of information is the city attorney, fire department, or police department--although this may vary from location to location.

Another legal aspect that should not be overlooked is jurisdictional authority. That is, it should be determined which agency or group of agencies has the authority to enact legal instruments to designate a route for the transport of hazardous materials. Legal jurisdiction is probably the most important criterion for designating a lead agency. The objectives of the routing analysis will largely determine whose jurisdiction is affected. If the objective is to route through hazardous materials shipments, the lead agency must be responsible for regional transportation activities in order to coordinate route selection through more than one local government's jurisdiction. For local deliveries, the lead agency need not have regional jurisdiction but should be cognizant of the pattern of hazardous materials movements within the area. Regional coordination is an essential part of the route designation process to forestall the designation of routes that are largely untenable. For example, a community would likely encounter stiff opposition from hazardous materials carriers if it enacted ordinances requiring carriers to use highly circuitous routes in order to enter the city limits through only one access route.

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*As indicated in Section 2, the alternative should be included in the analysis even if there is a legal mandate precluding its use.

Variable Factors

Variable factor analysis consists of making numeric risk comparisons among the alternate routes available for hazardous materials transport. Risk, as previously defined, is the product of the probability of a hazardous materials accident and the consequences associated with the accident. This section presents the criteria by which the risk associated with the transport of hazardous materials on highways can be quantified.

Variable Factors, Criterion 1

Determining what materials are carried through and used in an area is the first step at this level. This involves first having a knowledge of which hazardous materials are to be considered and then deciding which hazardous materials to use in the risk analysis. It is difficult, if not impossible, to determine accurately which hazardous materials travel into and through an area because of the lack of published information in this regard. Rather, the planner must rely on: local knowledge; observation; and police, fire, and other local experience to determine which hazardous materials are appropriate for consideration. For example, all areas use chlorine in their water works and gasoline in service stations. However, the quantities used are a function of the size of the study area. An examination of the U.S. Census of Manufacturing for an area would suggest other hazardous materials, as would discussions with community leaders and other professionals.

Alternatively, Appendix B--the MTB data base of roadway accidents from July 1973 to December 1978--can be used as a default indicator of the types of hazardous materials transported in an area. If this default information is used, it is recommended that it be at the State level and that, where possible, a summary be made of the surrounding States as well.

Once the local list of hazardous materials is developed, a decision must be made regarding which material or group of materials will be used in the analysis. Some agencies may wish to plan for the worst case commodity carried in their area or the worst case commodity transported nationally. Others may want to perform the analysis for each commodity, derive a weighted average, or develop their own distances based on frequency of carriage. Whatever method is selected, it must produce exposure distance or distances that will permit the population calculations in the next step.

Variable Factors, Criterion 2

This step consists of determining the risk associated with each route for the respective hazardous material carried, in order to choose the route found to have the least risk based on the methodology presented in Sections 2 and 3.

If the risk is clearly less on one route, then the analysis is complete. However, if the risk values are similar, say within 10 to 25 percent of one another, then the third level of analysis should be undertaken. Local procedures may dictate that the risk threshold for using the subjective criteria be even greater.

<u>Subjective Factors Criteria</u>

The degree to which subjective factor analysis is completed is decided by the professional judgment of those accomplishing the alternatives analysis. The primary purpose of this discussion is to lend support to the variable factors analysis. Two analyses that have been identified as subjective criteria are: developing a comparison of the motor carrier's time and travel costs for each route; and evaluating the difference in response capability. The time and costs comparison should be calculated with the cooperation of local carriers, in an effort to capture the latest fuel costs. The analysis of the difference in response capability should determine the proximity and capability of a hazardous materials accident suppression. To make the proximity determination, it is sufficient to identify and discuss with fire personnel the proximity of all fire stations to each of the routes on a map. To make the capability determination, it is necessary to assess each fire station's ability regarding level of training for the type of hazardous material carried in the area under study. This assessment consists of comparing the hazardous material carried in the local area to those listed in Appendix F. For each material found in Appendix F, an assessment must be made regarding the response capability. That is, full-time professional fire fighters are more likely to recognize a placard and provide the proper agent to extinguish a chemical fire; whereas volunteer or poorly trained personnel are more likely to simply flood the chemical fire with water, which may make certain chemical fires worse. Accordingly, for each locally transported chemical listed in Appendix F that requires a suppression agent other than water, the planner should consult with fire personnel to determine how they would likely respond. Those fire stations that have better training should be noted along each route, as should those with less training. The implication is that better trained fire personnel are more likely to mitigate a spill properly and thereby make the route safer.

Another subjective criterion analysis is comparing the number of highway structures. An enumeration of highway bridges, tunnels, and underpasses should be made for each route. Any particularly sensitive structures with respect to size or location should be noted. The objective here is to suggest that an accident on a route with fewer structures will have less severe consequences.

Another analysis in this category is identifying and enumerating special populations. This criterion involves making comparisons of the number of

special population centers such as schools, hospitals, and senior citizen homes within the exposure zone. The route with the fewest of these facilities would be the most desirable one.

Other criteria can also be developed and used in this analysis, including: ecologically sensitive areas; proximity of utilities (water, power, or communications facilities); ambient environmental characteristics; water shed locations; and general meteorological conditions. These and other criteria are usually site-specific and, accordingly, their development is left to the local agency. The following discussion illustrates the application of these criteria in the Washington, D.C., case study.

RISK METHODOLOGY APPLIED TO WASHINGTON, D.C., CASE STUDY

Introduction

The first questions to be answered in evaluating alternative hazardous materials routes are: who should perform the analysis, who should be informed of it and coordinated with, and who should implement the recommendations? The choice of an appropriate performing agency will depend on legal jurisdictions, familiarity with hazardous materials movements, and staff capability. In the Washington, D.C., hypothetical case study, the appropriate agency would be the Washington Council of Governments (WASHCOG). The choice of coordinating and implementing agencies will vary from area to area. Since the objective of the case study is to designate through routes, the responsible agency must have jurisdiction in the three areas involved: Virginia, Maryland, and the District of Columbia. The following discussion presents the results of the case study and illustrates the use of the proposed criteria for designating hazardous materials routes.

Mandatory Factors

Within the metropolitan Washington area, several roadways prohibit truck traffic because of clearance height and weight limitations. The George Washington and Baltimore-Washington Parkways are two examples of routes that would be excluded on the basis of mandatory factors.

Another mandatory factor affecting route selection is a District of Columbia ordinance which prohibits hazardous cargoes in the Mall Tunnel on I-95 near the U.S. Capitol. The District has designated a hazardous cargo route which diverts hazardous materials carriers away from the tunnel and I-95. However, this route is not precluded from the analysis because the legal reasons may not necessarily involve least risk.

Variable Factors

Probability Calculations

Accident rates are used in this part of the analysis to determine which of the alternative routes has the greatest likelihood of an accident occurring. As discussed in Section 2, interstate highways have better safety records, as compared with highways without controlled access such as urban arterials.* Accident rates for the alternative routes in the case study were estimated by using the predictive models described in Section 2. (Use of the interstate predictive model was illustrated earlier for Alternative 1 in Table 11 of Section 2.) The accident rates are converted into probability statements by multiplying the segment accident rate by its length (or exposure). The probability values for all of the alternatives are presented in Appendix D.

Consequence Calculations

In order to apply the consequence methodology to the case study, it was necessary to select a hazardous materials class to be evaluated. The risk methodology calculates potential hazardous materials impacts on the basis of the range of influence that can be associated with a particular class of materials.

Flammable liquids was selected as the case study hazardous materials class for several reasons. First, gasoline is a commodity within this class, and the case study was designed to illustrate likely conditions. The Virginia survey of trucks revealed a high incidence of flammable liquids carriers within the truck traffic stream (see Table 13 p. 61). Another contributing factor was that the range of impacts for gasoline--0.5 miles (0.8 km)--was representative of several hazardous materials classes, including: combustible liquids, flammable solids, oxidizers, flammable compressed gas, and explosives (see Table 17 p. 71). Lastly, flammable liquids represent the hazardous materials class most commonly involved in accidents, as recorded by the MTB (see Table 13 p. 61).

The number of persons living within a half-mile (0.8 km) radius along the four alternative routes was measured using census tract maps and data. Property was inventoried along these routes, but estimates of the value of the property were not made. The calculations for these analyses are presented in Appendix E. Each of the route segments has an associated population estimate and inventory of property. Alternative 4 has the largest number of persons (116,565) living within its zone of impacts, followed by Alternative 3

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*In general, interstate highways have fewer total accidents than urban arterials per million vehicle-miles. Fatal and injury-producing accident rates may be comparable, however.

(114,890), Alternative 2 (81,083), and Alternative 1 (60,875). The number of roadway structures along each of the alternatives shows a similar relationship, as illustrated in Table 22.

TABLE 22

HIGHWAY STRUCTURES ON THE FOUR ALTERNATIVES

Alternative	Number of Bridges	Number of Overpasses
1	9	12
2	12	15
3	26	37
4	25	37

Population Risk Calculations

After the accident probabilities and population values have been determined for each segment on the alternative routes, the information is transferred to Worksheet 4. Table 23 presents the risk calculations for Alternative 1; risk calculations for the other alternatives are presented in Appendix G.

Column 3 on Worksheet 4 is a constant which represents the probability of a hazardous materials vehicle being involved in an accident given that a vehicular accident occurs. This probability is the ratio of hazardous materials accidents to all accidents during the years 1973 to 1978. There were 93.2 million accidents involving all vehicles during this period (1), and 2,104 involving hazardous materials carriers--for a ratio of 2.3×10^{-5} to one. The product of column 2 (probability of any vehicle accident) times column 3 (incidence of hazardous materials vehicle accidents) is the probability of a hazardous materials vehicle accident occurring.

TABLE 23

Alternative: 1

Date: ____________

Page 1 of 1

WORKSHEET 4: POPULATION RISK CALCULATIONS

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

1	2	3	4	5	6
SEGMENT	P(ANY VEHICLE ACC.) ×	H.M. ACCIDENT INCIDENCE FACTOR =	P(H.M. VEH. ACC.) ×	SEGMENT POPULATION =	SEGMENT POPULATION RISK
1-A	7.575×10^{-6}	2.3×10^{-5}	1.742×10^{-10}	8436	1.470×10^{-6}
1-B	1.949×10^{-6}	"	4.483×10^{-11}	9047	4.056×10^{-7}
1-C	4.842×10^{-6}	"	1.114×10^{-10}	1023	1.140×10^{-7}
1-D	9.184×10^{-6}	"	2.112×10^{-10}	22078	4.663×10^{-6}
1-E	11.830×10^{-6}	"	2.721×10^{-10}	20291	5.521×10^{-6}
		"		TOTAL	1.217×10^{-5}
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		2.3×10^{-5}			

The hazardous materials accident probability value for a segment times the associated consequences or population value (column 5) produces the risk value for transporting hazardous materials on that segment. Summing across all segments produces the total population risk for the entire route.* The population risk for Alternative 1 when the hazardous materials class is flammable liquids is: 1.217×10^{-5}. For an individual living within the impact zone, the odds of being affected by a hazardous materials release are about one in one hundred thousand.

Risk Comparison for Hazardous Materials Route Alternatives

Worksheet 5 is used to summarize the population risk calculation and property inventories performed in the case study (see Table 24). Entries within the Land-Use columns may be either the risk values calculated for each land use type** or simply summations of the amount of roadway frontage within each category. Similarly, entries within the Structures columns may be the risk value for bridges and overpasses along the route or the total number of these structures. In the Washington case study, the number of highway structures and amount of land-use frontage were recorded; property risk values were not calculated.

The selection of the best route for a specified hazardous materials class will depend on the criteria the community applies in the evaluation process.

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*Mathematically, this approach is not entirely correct, as the probability of a vehicle not reaching the next segment is overlooked (i.e., having an accident). The true form of the equation is:

$$P(\text{Accident}_{\text{Total Route}}) = P(\text{Accident}_{\text{Segment 1}}) + [1-P(\text{Accident}_{\text{Segment 1}})]\,P(\text{Accident}_{\text{Segment 2}})$$
$$+ [1-P(\text{Accident}_{\text{Segment 2}})]P(\text{Accident}_{\text{Segment 3}}) + \ldots$$

However, the accident probabilities are so small that $1-P(\text{Accident}_{\text{Segment } i})$ is effectively 1 and can be reasonably ignored.

**Land-use risks are calculated in the same way as the population risks except that the segment property value is substituted for the segment population value on Worksheet 4. Summing across all segments produces the property risk for the entire route. The methodology for this calculation was presented in Section 3.

TABLE 24

Date: ________

Page 1 of 1

WORKSHEET 5. ALTERNATIVES COMPARISON

ALTERNATIVE		LENGTH (miles)	POPULATION			LAND USE ** (miles fronting roadway)						STRUCTURES		SPECIAL PROPERTY	EMERGENCY RESPONSE
#	O/D		RISK	TOTAL EXPOSED	SPECIAL	RESIDENTIAL HIGH	RESIDENTIAL MEDIUM	RESIDENTIAL LOW	PUBLIC	COMMERCIAL	INDUSTRIAL	BRIDGES	OVERPASS		
1	From: I-395 & I-495 To: Rte.50 via I-495	23.3	1.217×10^{-5}	60,875	22 Schools	0.1	12.4	11.2	1.5	1.2	4.8	9	12	.Sewage Plant .Woodrow Wilson Bridge	
2	From: I-395 & I-495 To: Rte.50 via I-295	24.3	1.311×10^{-5}	81,083	25 Schools	0.6	4.2	5.3	.4	1.5	6.9	12	15	.Sewage Plant(2) .Woodrow Wilson Bridge	
3	From: I-395 & I-495 To: Rte.50 via I-395	23.3	1.651×10^{-5}	114,890	*	2.5	7.5	3.0	4.4	5.0	2.0	26	37	*	
4	From: I-395 & I-495 To: Rte.50 via I-395&NY Ave.	22.0	1.843×10^{-5}	116,565	*	2.5	5.2	1.5	5.2	5.5	5.0	25	37	*	
	From: To:														
	From: To:														
	From: To:														

*Alternative eliminated prior to application of this subjective criteria.
**Land use was not used as a criteria in the case study evaluation.

The most obvious criterion is selection of that route which poses the lowest risk to population. In the case study, Alternative 1 had the smallest population risk value, followed in increasing order by Alternatives 2, 3, and 4, respectively.

Unless the differences between the risk values for the alternatives are fairly large, the methodology recommends that additional, subjective criteria be applied to aid the decision process. Table 25 presents the calculated risk values for the four alternatives and the percentage difference between them. Alternatives 1 and 2 cannot be strongly differentiated on the basis of a 6.4 percent difference; however, Alternatives 3 and 4 are excluded from further consideration because their risk values exceed the lowest potential alternative by 34.0 and 49.6 percent, respectively.

TABLE 25

POPULATION RISKS ON THREE ALTERNATIVE HAZARDOUS MATERIALS ROUTES IN WASHINGTON, D.C.

Alternative	Population Risk	Percent Difference From Alternative 1
1	1.217×10^{-5}	
2	1.311×10^{-5}	6.4
3	1.651×10^{-5}	34.0
4	1.843×10^{-5}	49.6

Because Alternatives 1 and 2 are relatively similar with respect to population risk (and property risk values were not calculated for the alternatives), subjective criteria were used to identify the different route characteristics that might make one alternative preferable to the other. The following discussion documents the use of subjective criteria to select the hazardous materials route for flammable liquids that poses the smallest overall threat to the community.

Subjective Factors

There are no clear-cut decision rules for the selection and application of subjective factors. In this third level of criteria (after evaluation of mandatory and variable factors), the community may wish to compare the remaining two alternatives along several dimensions. Worksheet 5 is structured to permit easy comparison of the alternatives. Table 24 presents the characteristics of the four alternatives for the Washington case study.

Neither Alternative 1 nor Alternative 2 is clearly preferable on the basis of overall length. The travel times in Alternative 2 will probably be longer than in Alternative 1, as the route includes segments on urban arterials. On the other hand, congested traffic conditions on the Beltway (I-495) frequently cause delays offsetting the potential travel time advantages for hazardous materials carriers routed on Alternative 1.

Another subjective criterion used in the case study was the property inventory. With fewer roadway structures along the route and only one sewage plant within the potential impact zone, Alternative 1 poses less threat to special properties than Alternative 2.

Using the criterion of special populations, Alternative 1 is again preferable to Alternative 2. The measure of special populations for the case study was schools, and Alternative 1 had fewer schools in its impact zone than Alternative 2.

Conclusion

Alternative 1 is the recommended hazardous materials route for vehicles carrying flammable liquids. Alternative 1 poses the lowest risk to residential population and exposes fewer roadway structures. Alternative 1 also has fewer schools within its impact zone than the next most likely alternative. In general, however, the differences between Alternatives 1 and 2 are not particularly large.

SUMMARY

Section 4 presents possible objective and subjective criteria that may be used in the final route selection. The study suggests that hazardous materials routes be eliminated from consideration if a substantial margin of difference can be observed in the risk values calculated for the alternatives. If a hazardous materials route selection cannot be made on the basis of the first two criteria levels (mandatory and variable), various subjective criteria must be used to differentiate the alternatives.

In the Washington, D.C., case study, the alternative that used interstate highways exclusively and bypassed the major population centers proved to be the overall safest route. Of the initial four alternatives, Alternatives 3 and 4 were eliminated because their population risks substantially exceeded those associated with Alternatives 1 and 2. Although the differences in the remaining two alternatives are not great, Alternative 1 may be designated as the preferred hazardous materials route on the basis of subjective criteria.

The next section discusses the results of pilot testing the methodology in two additional jurisdictions.

REFERENCES

1. National Safety Council, Accident Facts 1973-1978, Chicago, Illinois.

2. Price, Dennis L., "Ten Most Critical Issues in Hazardous Materials Transportation," Report from A3C10 Committee, Transportation Research Board, National Research Council, 1979.

5. RESULTS OF PILOT TESTING CRITERIA FOR DESIGNATING HAZARDOUS MATERIALS TRANSPORT ROUTES

PILOT TESTING OVERVIEW

This section describes the results of pilot testing the hazardous materials route selection methodology presented in Sections 1 through 4. The test applications of the risk methodology were evaluated from two perspectives: if local agencies can understand and use it; and if it offers any advancement in the state-of-the-art in hazardous materials route selection. Results from two pilot tests are presented with respect to these criteria, and other pertinent information is provided to enable potential users of this report to evaluate staff and resource requirements for conducting local evaluations.

Pilot tests were conducted in the cities of Nashville, Tennessee, and Seattle, Washington. The objectives of the performing agencies in these two communities differed somewhat, and this difference is reflected in the types of analyses performed and use of resources. In Nashville, a 14 member committee was assembled for this pilot test. It included representatives from the Department of Civil Defense, the Metropolitan Police and Fire Departments, the Bellevue Volunteer Fire Department, the City Department of Traffic and Parking, the Metropolitan Planning Commission, the Fleet Transport Company (a common carrier), and Tennessee State University. This multidisciplinary group approached the pilot test with the objective of determining the preferred through routing for hazardous materials transport in Nashville. In addition to calculating the risk values, the Nashville committee spent considerable time evaluating subjective criteria factors to refine their analysis and choose the route that best satisfied a variety of criteria.

The performing agency in Seattle, the Puget Sound Council of Governments (PSCOG) had several objectives when they performed the pilot test. One objective was to develop data that would ultimately contribute to their comprehensive hazardous materials management study that is underway. PSCOG wished to quantify some of the transportation and land use variables that might affect their hazardous materials policy recommendations and regarded the routing exercise as a useful way to become familiar with these variables and perform initial analyses of hazardous materials routing alternatives. Another objective was to provide inputs for the public discussion that is developing over hazardous materials management in the area. PSCOG wished to determine if the routing methodology would be useful for public presentations and if they later became the basis for recommendations to the city councils within the Central Puget Sound Region. PSCOG also wished to determine the level of resources necessary to conduct routing analyses on a regional scale to evaluate the cost-effectiveness of the methodology for possible future applications.

The results of the two pilot tests are presented below. Both performing agencies demonstrated a strong level of interest and commitment to the project. Since the two pilot tests were approached differently, the findings provide a range of experience. The study team considers the two pilot tests representative of the types of uses to which the risk methodology materials would be applied and believes that the issues that arose during the demonstrations would likely be encountered in using the materials elsewhere.

NASHVILLE PILOT TEST

The City of Nashville pilot tested the risk methodology for about half of the major through routes in Metropolitan Nashville. The lead agency for the pilot test was the Department of Civil Defense, which was assisted by representatives from the five public agencies, the common carrier, and the university listed above. Most members of the committee had not had an opportunity to review the pre-draft final report for this project. A one-hour 35 mm slide briefing of the methodology and pre-draft materials was therefore provided.

Nashville's interest in acting as a test site stemmed from several local objectives, including the following:

- The City had previously faced a hazardous materials routing problem (discussed below) and wanted to have the in-house capability to quantitatively evaluate alternate routes for future high risk materials transport through the City.

- The City tentatively plans to conduct a comprehensive hazardous materials safety program and is currently planning to use the risk methodology to investigate the transportation aspects of the issue.

- The City believes in contingency planning and views the methodology as a possible way to help identify the preferred existing and potential truckstops, storage facilities, and roadways for hazardous materials transport.

One of the immediate uses of the pilot test was as a mechanism to organize, evaluate, and sensitize various City departments as regards hazardous materials routing issues. Long-range plans for applying the pilot test results will be determined by City policies regarding hazardous materials management.

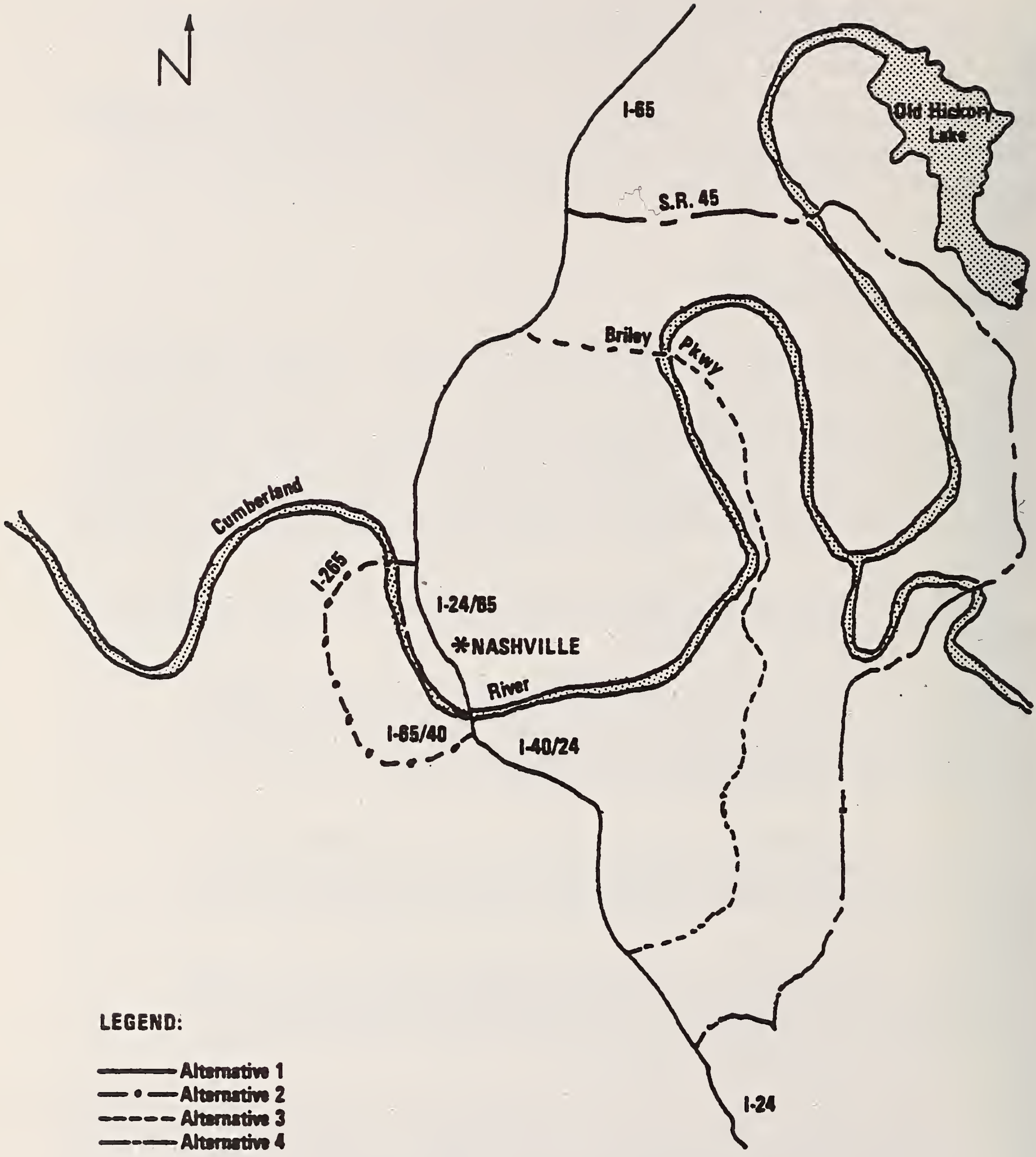

FIGURE 11: NASHVILLE, TENNESSEE, MAJOR ROUTES.

Pilot Test Objectives

The hazardous materials risk methodology was applied to four alternative through routes. The objective of this application was to determine, in general, which route(s) had the least risk. Figure 11 presents a sketch of the major routes in Nashville, the four alternatives studied, and the area's major geographic feature: the Cumberland River.

Pilot Test Results

Alternatives Selection

Because the committee was fairly large, selecting the routes to be analyzed proved a challenging task which provided good insights into the real problems a community faces when applying the risk methodology. Representatives of virtually all potentially affected parties viewed the problem from their own perspectives, and this led to substantial discussion about which routes should initially be selected or eliminated.

The motor carrier viewpoint was that the analysis should be limited to interstate routes because hazardous materials carriers mostly use interstates, and that determining local routes is beyond the scope of the pilot test.

The police department felt that examining the interstates was reasonable but that, because of the high accident rate along portions of I-265, the Interloop of the city, I-65 would be an obvious choice. The police department also felt the evaluation would not contribute much to their understanding of the problem.

The Department of Civil Defense supported the police position and added that it had previously been asked to escort a shipment of phosgene gas through the City, arriving from I-40 West going to I-40 East, and had chosen a route that consisted of I-40, I-265, I-24/65, I-40/24, and I-40. This route had been chosen because of the known high accident rate problem along the I-65/40 link of the Interloop. Civil Defense also suggested that Briley Parkway might be an appropriate route since it has limited access and was built near interstate standards.

The Traffic and Parking and Planning Commission thought population and traffic density would be less on Briley Parkway but also wanted to investigate the I-265 link of the Interloop. The committee decided to limit the pilot test to those hazardous materials entering the metropolitan area from the North on I-65 and exiting by either I-40 or I-24.

Lastly, FHWA suggested that since this was a pilot test, State Route 45 should be investigated because it was an alternative, although a somewhat longer route. The length comparisons of the routes are indicated in Table 26.

TABLE 26
LENGTH COMPARISONS OF ALTERNATE
HAZARDOUS MATERIALS ROUTES

Route	Miles	(Km)
Alternate 1 (I-65 to I-24)	12.95	(20.72)
Alternate 2 (I-65, I-265 to I-24)	14.00	(22.4)
Alternate 3 (Briley Parkway)	13.15	(21.04)
Alternate 4 (State Route 45)	21.30	(34.08)

Level of Analysis Comparison

After selecting the routes to be analyzed, the pilot test committee considered the level of analysis for the test. The work plan was developed through an iterative process, whereby different approaches were proposed, discussed, rejected, or altered until agreement was reached on a final process. The following discussion briefly traces this process.

The first proposed analysis plan (depicted in Figure 12) was an ambitious undertaking which sought to develop risk values for the alternative routes by time-of-day and for special versus commonly transported hazardous materials. (Special materials were defined as those hazardous materials classes in Table 17 (p.71) that have a potential impact radius of greater than 0.5 miles (0.8 km).) The proposed plan was subsequently revised to limit the analysis to special materials, in order to reflect resource availability.

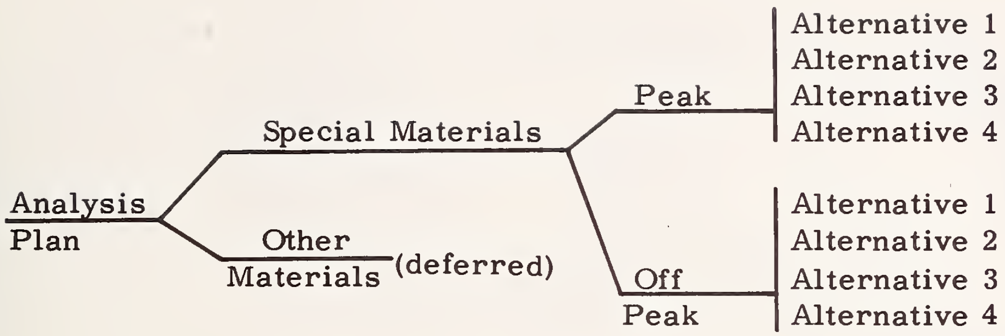

FIGURE 12: ANALYSIS PLAN 1

The product of this analysis would have been very useful to the Department of Civil Defense if they were again asked to determine a route and provide an escort for a special hazardous materials shipment. The committee, however, chose to reject the proposed plan for two reasons. First, the Traffic and Parking Commission pointed out that signing separate hazardous materials routes for peak and off-peak would be difficult at best. Second the police department indicated that enforcement would be a considerable problem. Analysis Plan 1 was thus rejected primarily for practical reasons; it would have hindered effective implementation and enforcement of the analyses results.

Analysis Plan 2, was essentially a refinement of Analysis Plan 1 in that based on the reasons just presented, the committee thought the peak and off-peak analysis should be tabled for later refinement.

The next issue was to select the hazardous materials class to be analyzed. Further consideration of special materials routing was eliminated at this point, as the committee lacked information indicating what special materials were carried in the area. After one of the committee members argued that the time being spent on this phase of the project was becoming excessive, the committee chose to analyze the routes based on the impact distance that best represented most hazardous materials. In summary, the committee chose to analyze four alternative through routes for the transportation of hazardous materials with a potential impact radius of 0.5 miles (0.8 km). In effect, the committee accepted the MTB accident date as default information for which materials are transported in the area. The final analysis plan (see Figure 13) was adopted for evaluating shipments of flammable liquids, combustible liquids, and corrosives.

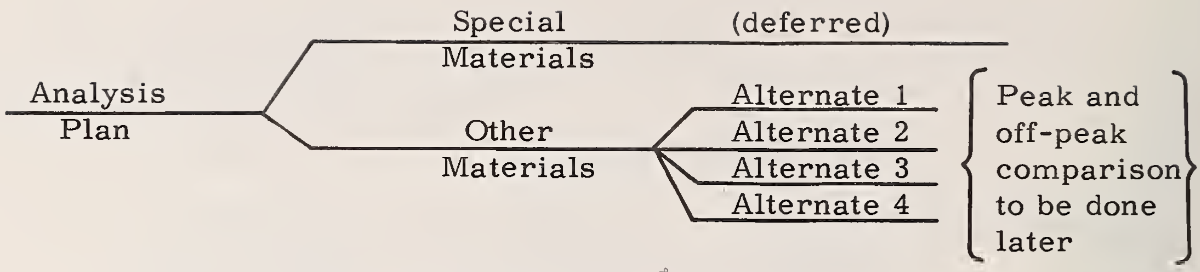

FIGURE 13: FINAL ANALYSIS PLAN

A Priori Route Selection

Before initiating the route analyses, the contractor asked all members of the committee to cast a ballot for their intuitively preferred routing alternative. The purpose of this exercise was to help determine whether the risk methodology advances the state-of-the-art in hazardous materials route designation. Table 27 shows the results, which indicate a preference for Alternative 3. (The *a priori* judgments are compared to the calculated risk values later in the text.)

TABLE 27
INTUITIVELY PREFERRED ROUTINGS

Alternative	Number of Votes
1	4
2	1
3	5
4	0

Route Segmentation and Data Collection

The next step of the analysis consisted of segmenting the alternatives and collecting data pertinent to the analysis. Accident records, traffic maps, and land-use maps were obtained from the Metropolitan Police Department, Traffic and Parking Department, and Metropolitan Planning Commission.

An inspection of the available data suggested that route segmentation could best be done on the basis of average annual daily traffic (ADT). ADT was used to segment the routes because the accident and population data were formatted in a way that could be easily aggregated into segments corresponding to ADT segments.

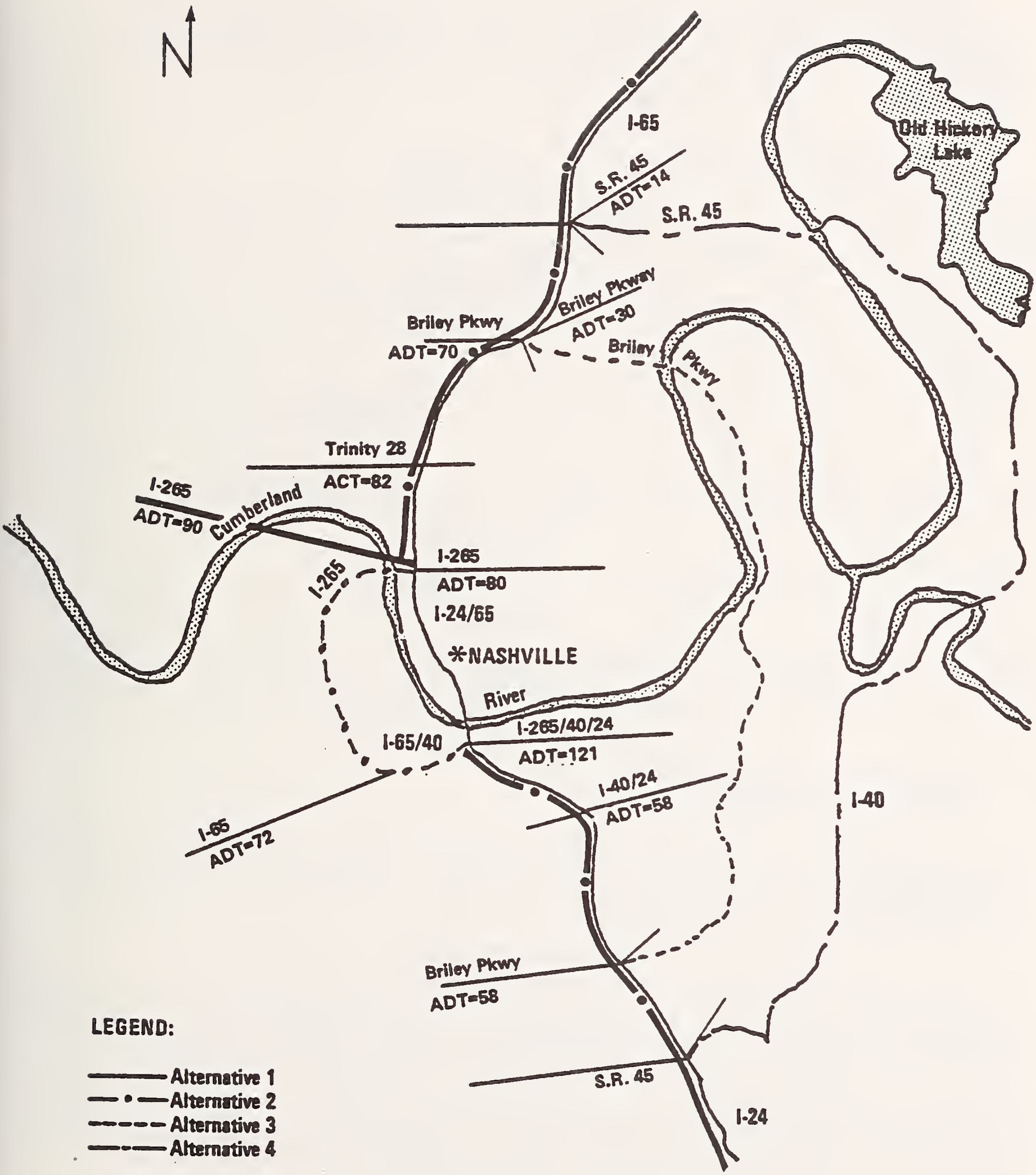

FIGURE 14: ROUTE SEGMENTATION AND ADTs(000)

Figure 14 illustrates the results of the route segmentation and the ADTs used for the analysis. Only one ADT value was used for Briley Parkway (and, similarly, State Route 45) because the variation in ADTs along these routes did not exceed 10 percent.

Probability Calculations

Accident rates for the probability calculations were developed from the Metropolitan Police Department computerized accident data base. After a printout was obtained of all accidents that occurred during the year on a particular route, the accident frequencies were manually sorted and assigned to the proper route segments. The sorting required a high degree of familiarity with the roadways, as the accidents were recorded by intersection. Fortunately, the police department representatives were able to determine easily the number of annual accidents on each alternative's segments.

After determining accident frequencies on each segment, the committee calculated the accident rates by using the following formula:

$$\text{Accidents}/\text{Million Vehicle-Miles} = \frac{\text{Accidents/Year}}{\text{365 Days/Year} \times \text{ADT} \times \text{Segment Length}} \times 10^{6}$$

Accident probabilities were calculated subsequently by multiplying the accident rate on a segment by its length. The probability values are presented in Figure 15.

Consequence Calculations

The Nashville Metropolitan Planning Commission maintains an up-to-date census data base aggregated by planning zones. Although the boundaries of the planning zones are not based on census tracts, the format is similar and the information just as easy to use.

The committee was not satisfied with census population alone, however, as the consequences indicator and chose to introduce another variable. This dissatisfaction was due to the fact that in many cases motorist population (as measured by ADT) was equal to or greater than the population within a half mile (0.8 km) of either side of the roadway. Accordingly, exposed population in each segment was calculated by adding census population to the product of one-half the ADT times the average auto occupancy (1.35 motorists per vehicle). One-half the ADT was used because a great many of the trips were assumed to be work trips, and the motorist could not be in two places simultaneously (i.e., both morning and evening peak). The resulting population exposure values are indicated in Figure 16.

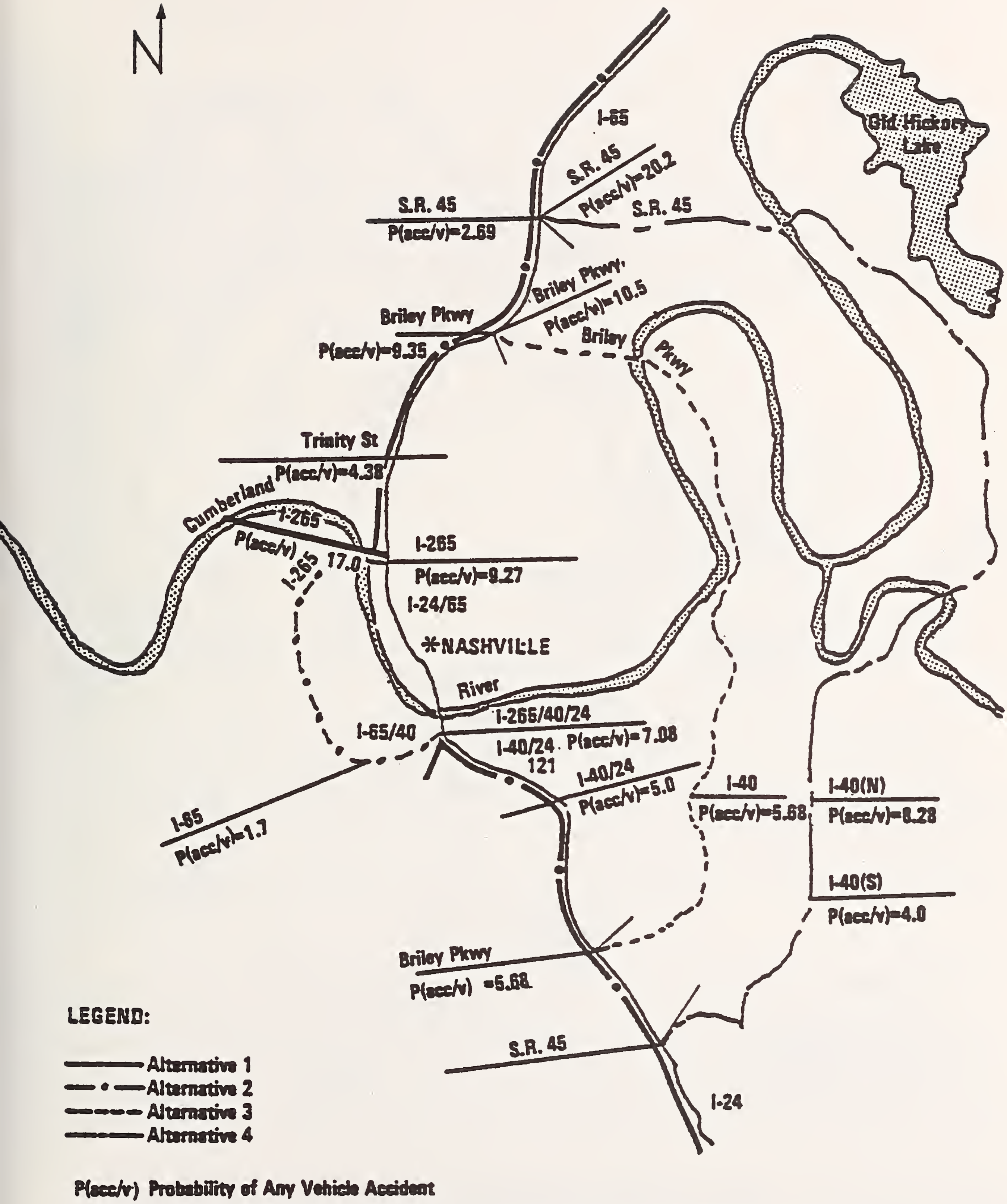

FIGURE 15: ACCIDENT PROBABILITIES ON ROUTE SEGMENTS ($x10^{-6}$)

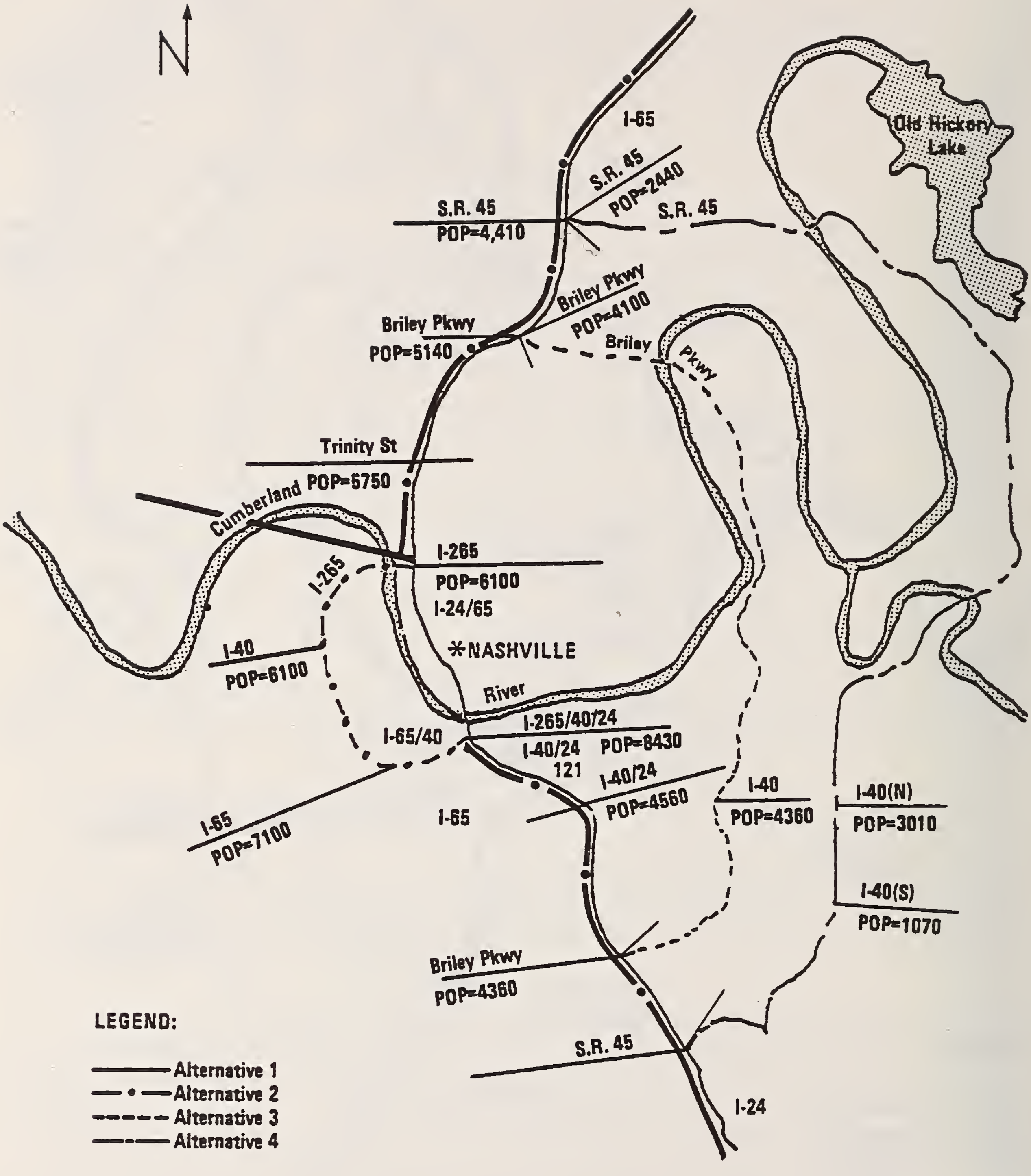

FIGURE 16: POPULATION EXPOSURE BY SEGMENT

Risk Calculations

To calculate hazardous materials risks on each route, the accident probabilities reported in Figure 15 were factored to represent the incidence of hazardous materials accidents in the total accident record. The probability of a hazarous materials accident on each segment was the multiplied by the respective population to produce segment risk values. The segments on each alternative were then added, to produce the total route risk values indicated in Table 28.

TABLE 28
SUMMARY OF RISK VALUES

Alternative	Risk Value (10^{-6})
1	57.15
2	70.83
3	51.40
4	18.05

This finding was somewhat surprising, as the committee members had previously voted intuitively for the routes shown in Table 26.

Although nobody had cast a ballot for Alternative 4, it had the lowest calculated risk value. After further discussion, it was learned that most members felt that motor carriers would not use it because of bridge limitations, at-grade rail-highway crossings, and several sharp turns. Through its knowledge of local conditions, the committee was effectively applying the first mandatory criterion of Section 4. In retrospect, if the briefing had stressed the mandatory criteria more, the committee would have eliminated Alternative 4 earlier because of physical constraints.

The Committee members who had voted for Alternative 1 took the position that they would still favor Alternative 1 over Alternative 3 most of the time because the analysis failed to consider an important special population along Alternative 3: Opryland USA, which has an average tourist population of 20,000 persons 3 months of the year (see Figure 17). If Opryland's population is included in the analysis, then the risk value for Alternative 3 increases to 72×10^{-6}, which makes Alternative 1 a clearly less risky route.

To provide additional support for this decision, the fire and ambulance locations were plotted along the Alternatives as indicated in Figure 17. This subjective criterion suggests that Alternative 4 would have much less support in the immediate area in the event of a hazardous materials release.

FIGURE 17: LOCATION OF FIRE (F) AND AMBULANCE (A) STATIONS; AND OPRYLAND, USA

Nashville Committee Reaction to the Methodology

The Nashville participants performed the analysis well and quickly grasped the methodology. The reaction to the methodology was highly favorable, and there was considerable discussion about extending, refining and possibly computerizing it for use at the citywide level. The participants also demonstrated sensitivity to the political implications of their findings by noting that if Alternative 3 were a designated hazardous materials route, then several truck stops might suffer from a loss of business. However, it was generally felt that this type of problem could be resolved.

From FHWA's evaluation perspective, few problems were encountered. Assistance was limited to helping some participants understand the methodology; this was accomplished with a training/implementation document or a seminar. Participants were not always aware of each other's responsibilities in the hazardous materials management field, and the formation of the committee greatly helped an exchange of information within the Nashville metropolitan area. Within their respective fields of specialization, however, the participants clearly had an excellent knowledge of the roadway, accidents, population, and hazardous materials carrier operations in the region.

Few questions were raised during the pilot test. Inquiries were made about FHWA's intent regarding this report and the project and about scientific notation (10^{-6}), and questions were asked pertaining to procedures in Sections 1 through 4 of the pre-draft report which had not yet been read. In general, the participants felt comfortable with and pleased by the applications of the methodology to their area.

Level-of-Effort

The Nashville pilot test required approximately 70 person-hours to evaluate about 50 miles (80 km) of roadway. Three and one-half person-hours were expended in the initial meetings where the routing issues were identified and the alternatives to be evaluated selected.

Data collection required 6 person-hours. This relatively rapid effort was possible because the committee consisted of representatives from various agencies who were able to identify quickly and gather the necessary information. Route segmentation was accomplished in 4 person-hours, and the accident probability calculations required approximately 6 person-hours. Developing consequence values for resident populations entailed 8 person-hours of effort, and adding the ADT factor required 1 additional person-hour. Calculating and discussing the risk values involved 10 person-hours. Much like the early part of the analysis, convening the committee to discuss the findings involved substantial investments of time.

Educational background of the participants included high school, special training, college, and several advanced degrees. The participants were well-versed in their respective fields and interacted at a high professional level. The contractor's presence at the site was not essential. The committee demonstrated a good understanding of the methodology and performed the necessary calculations with ease. The contractor's principal contribution was to facilitate the process, which suggests that the person-hours cited above may be conservative. The same results would have undoubtedly occurred without the contractor, but it might have taken somewhat longer. The contractor's level of effort was an additional 10 hours.

Anticipated Use of the Risk Analysis

At least two of the agencies indicated an interest in pursuing the methodology as a means to improve their services to the city. The agencies anticipate using the methodology in slightly different ways: one for project review, and the other for hazardous materials routing. The two agencies anticipate that results of their analyses will be considered at the highest appropriate local government level (e.g., Police for enforcement, Traffic and Parking for roadways, etc.). This expression of interest was interpreted as a strong positive endorsement of the methodology and a measure of the participants' confidence in the findings.

PUGET SOUND PILOT TEST

The Puget Sound Council of Governments (PSCOG) was the performing agency that applied the risk methodology to several highways in the Seattle metropolitan area. PSCOG is currently conducting a comprehensive multimodal study of hazardous materials transportation in the four-county Central Puget Sound Region with funding provided by the U.S. Department of Transportation. Although PSCOG is responsible for studying the entire region, the pilot test application was limited to the Seattle area because of resource constraints.

The Comprehensive PSCOG Hazardous Materials Study has four essential objectives:

- to identify the types and amounts of hazardous cargo transported through the region by ship, rail, motor carrier, air, and pipeline;

- to evaluate the roles, responsibilities, and capabilities of agencies with hazardous materials prevention or response mandates;

- to survey federal and state programs elsewhere to determine their applicability to the Central Puget Sound Region; and

- to develop options for a regional prevention and response plan based on the preceding analyses and incorportating public responsibilities, industry perspectives, legal considerations, resources requirements, etc.

The results of the comprehensive study will be presented to public and private sector officials in the region, in order to assess the need for hazardous materials transportation management and evaluate possible prevention and response options.

Pilot Test Objectives

The risk methodology was applied to six alternative routes. The objective of these applications was to calculate risk values for alternative through routes in the Seattle area and alternative local routings for traffic approaching a major industrial area from both north and south. The Seattle pilot test basically demonstrated that a relatively small amount of resources can be used effectively to determine the relative risks of routes through and into a city.

The principal focus of the pilot test from the contractor's perspective was to see if the performing agency could readily understand and use the materials presented in Sections 2, 3 and 4. PSCOG's motive for performing the analysis was to determine the suitability of the risk analysis technique for use in their comprehensive hazardous materials management study. PSCOG also wanted to become familiar with the types and availability of data that are appropriate for analyzing public safety, and to develop a series of initial risk calculations that can be refined at a later date when resources permit. At the time of the pilot test, PSCOG was only in its second month of the 15-month hazardous materials study and was in the process of assembling a steering committee for the project. It was unclear at that time whether or not routing was going to be included in the project scope, but PSCOG felt the ancillary benefits of becoming more familiar with this aspect of hazardous materials issues warranted its involvement.

Pilot Test Results

Alternative Selection

As can be seen in Figure 18, the City of Seattle is bounded on the east and west by water, and a major industrial area is located south of the central business district on Elliot Bay. The 6 alternative routings identified in

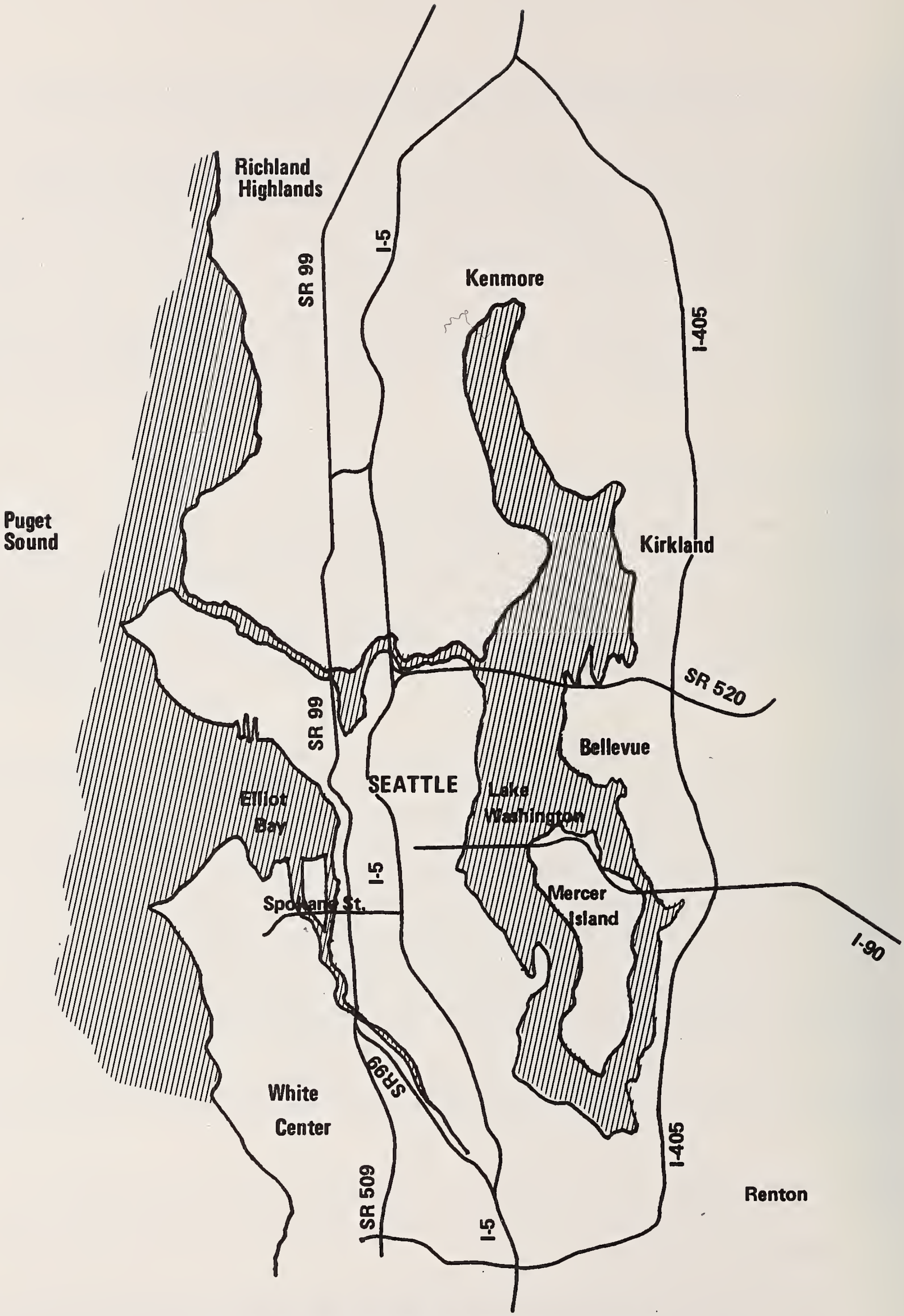

FIGURE 18: SEATTLE METROPOLITAN AREA

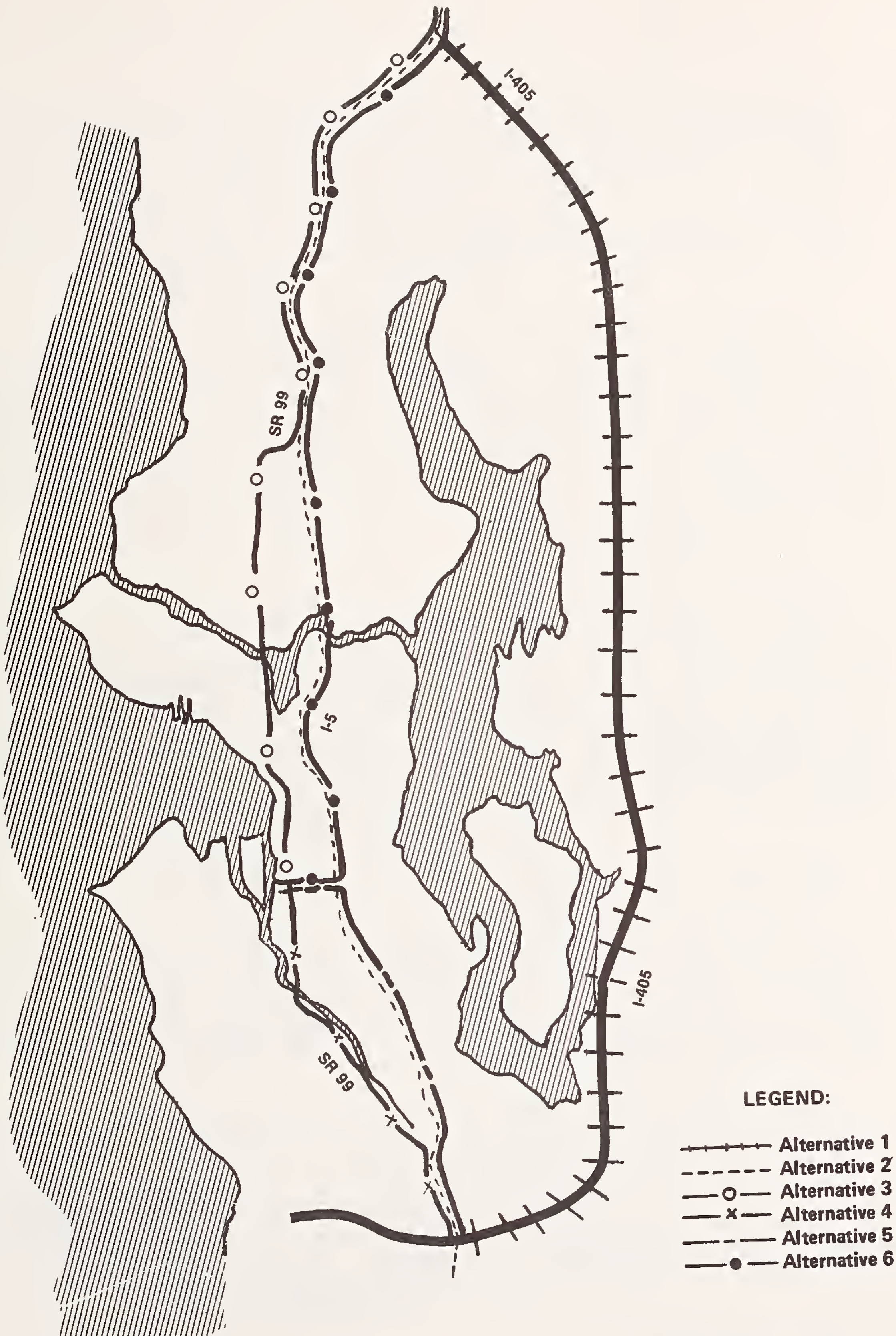

FIGURE 19: ALTERNATIVE HAZARDOUS MATERIALS ROUTINGS

Figure 19 were selected because they constitute the major roadways in the area and provide access to one of the largest industrial complexes in the region. The routings are principally on interstates or limited access state highways. Two of the local routings (Alternatives 3 and 4) include urban arterials on some segments but, in general, have good design characteristics. PSCOG felt that all of the alternatives were viable routing options and were commonly used by carriers.

The alternative through routes, I-5 and I-405, provide a good example of the tradeoffs associated with transporting hazardous materials through versus around a city. The route that bypasses the City (I-405) is longer (30.3 miles (48.5 km) versus 28.2 miles (45.1 km) on I-5) but travels through less densely populated areas. The local routes, on the other hand, travel along very similar corridors but are principally differentiated by their roadway characteristics.

A Priori Route Selection

Before calculation of the risk values, the two members of PSCOG involved in the pilot test were asked to select the roadways that would be their preferred hazardous materials routes based on their knowledge of the area. The two respondents had conflicting views based on their own sense of which areas had higher population densities, better roadway characteristics, greater peak and off-peak travel, etc. This lack of agreement indicated early on that the results were not necessarily a foregone conclusion and that the subjective criteria individuals are likely to apply to the process will vary significantly.

Probability Calculations

In order to calculate the probabilities (and consequences) for each route, it was necessary to segment the alternatives into discrete sections. The routes were segmented on the basis of accident rates and the boundaries of the PSCOG planning districts (which were either Census tract boundaries or combinations of Census tracts).

State and City accident rate data were available for all of the routes evaluated. The performing agency felt that these observed values would be more accurate than values predicted by the accident rate models, as well as more cost-effective. On some segments of roadways within the City, it was necessary to calculate the accident rates using observed accident frequencies and average annual daily traffic counts (ADT). The following formula was used to calculate the accident rates on these segments:

$$\frac{\text{Accident}}{\text{Million Vehicle-Miles}} = \frac{\text{Number of Accidents per Year}}{\text{365 days/year x ADT x Segment Length}} \times 10^{6}$$

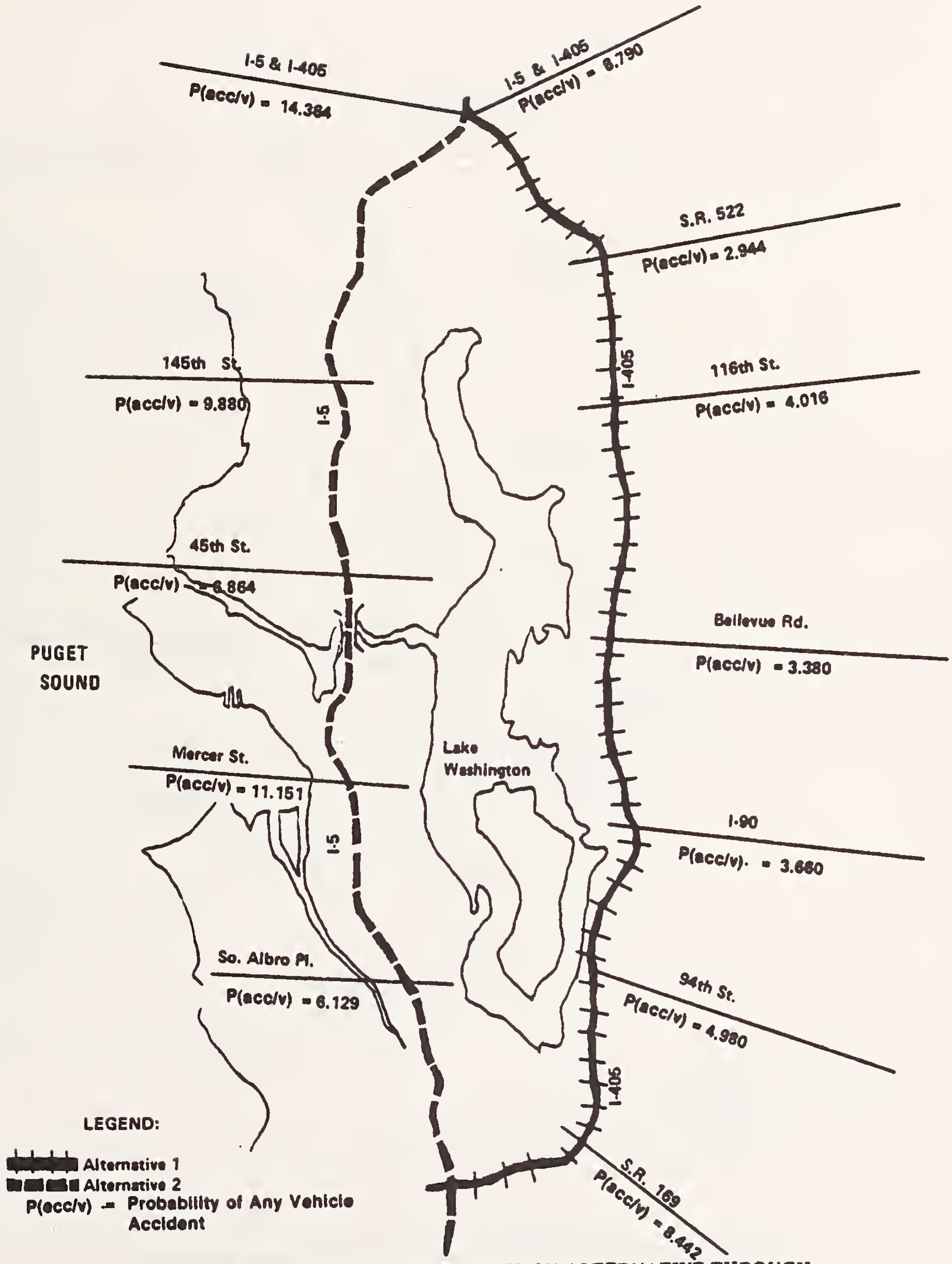

FIGURE 20: ACCIDENT PROBABILITIES ON ALTERNATIVE THROUGH ROUTE SEGMENTS ($x10^{-6}$)

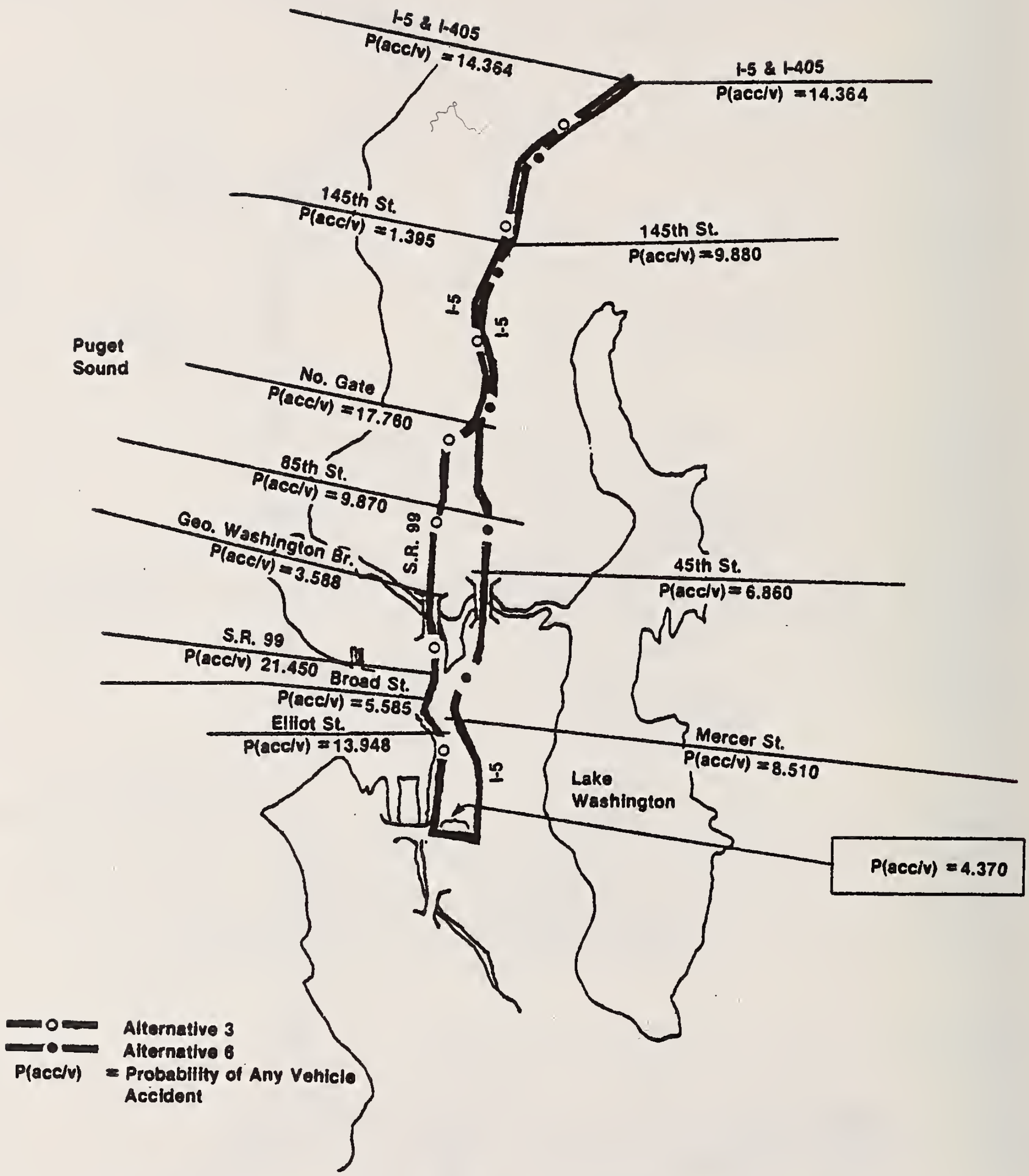

FIGURE 21: ACCIDENT PROBABILITIES ON ALTERNATIVE LOCAL ROUTES (x 10⁻⁶)

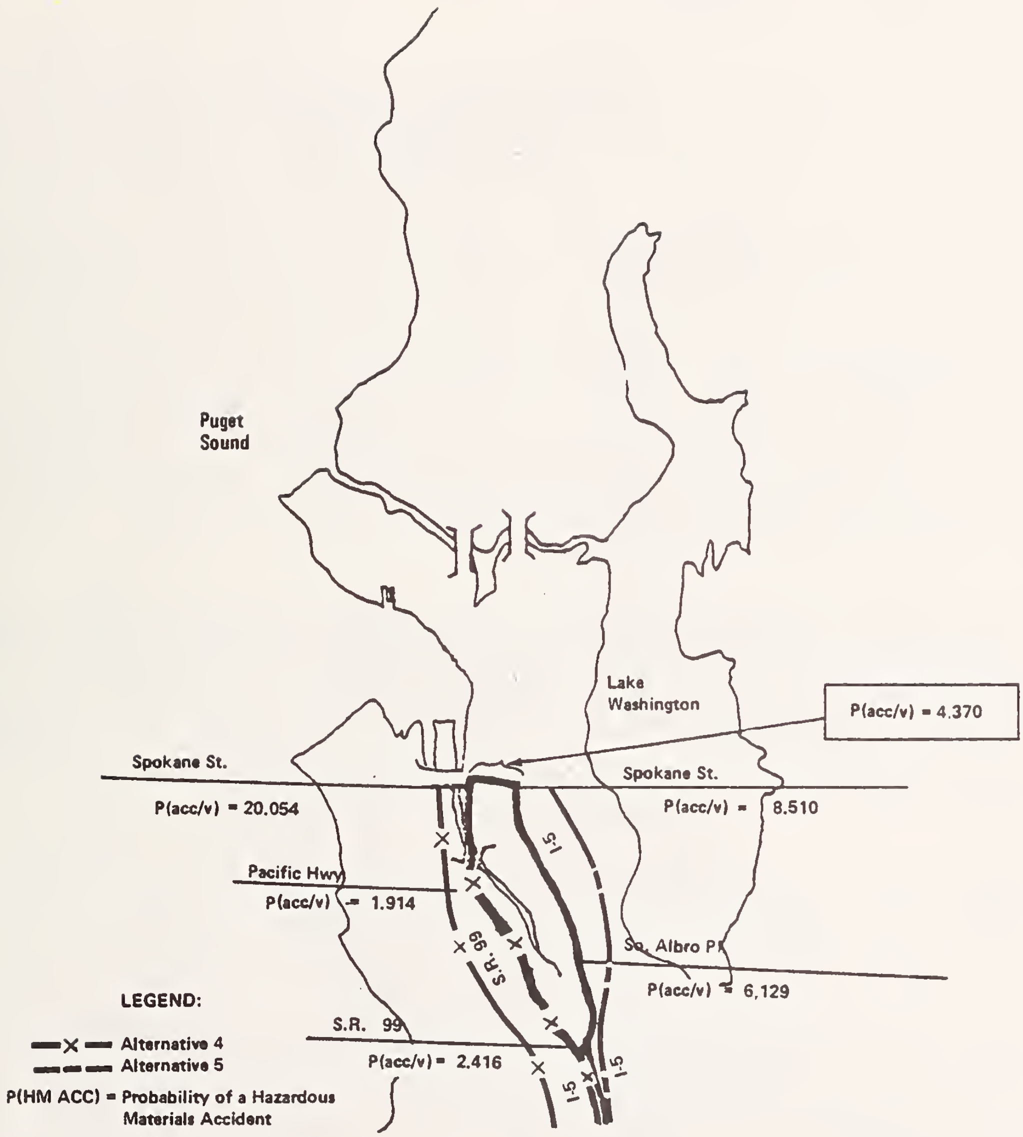

FIGURE 22: ACCIDENT PROBABILITIES ON ALTERNATIVE LOCAL ROUTE SEGMENTS ($x10^{-6}$)

The probability values for all vehicle accidents on the through and local routes are presented in Figures 20, 21, and 22.

Consequence Calculations

PSCOG maintains an EMPIRIC forecasting model and uses it to update its employment and population estimates for the region. The risk analysis was conducted with 1980 estimates for these parameters, to capture the most recent distribution of land use. In the course of developing the model, PSCOG created its own districts which were essentially based on Census boundaries. This did not create any problems for the pilot test since the information is the same as that provided in the Census, but it is formatted on a different geographic basis. The performing agency chose to refine the consequences-estimating component of the risk methodology by introducing employment as a variable. The objective was to portray more accurately the time-of-day locations of persons along the alternative hazardous materials routes. The pilot test was first conducted using population along the route and later with a combined population and employment value as the consequence variable to test the sensitivity of the risk analysis findings.

The resident populations identified in Figures 23, 24, and 25 consist of persons living within a half-mile on either side of the roadway. PSCOG chose the half-mile impact zone because it wanted to estimate the risk associated with transporting flammable liquids. Gasoline and petroleum products are commonly carried in the Puget Sound Region because of refining operations in the area and distribution activities at the port.

Figures 23, 24, and 25 also show the combined values for residential population and employment within the impact zones. The employment variable measures the number of persons working within that zone. Although this has the effect of counting employed persons twice (once at their home and again at their job), PSCOG felt it was important to portray more accurately the daytime distribution of persons. Ideally, it would be desirable to factor down the resident populations to represent the migration of persons from home to work place, but PSCOG did not feel the added refinements justified the effort at that time. Another confounding influence was persons who live and work in the same zone. Recognizing these biases, PSCOG chose to include employment in order to see how sensitive the risk calculations would be to this addition.

Risk Calculations

The relative risk differential for the through routes (Alternatives 1 and 2) remained about 2:1, with and without the addition of employment to resident population (see Tables 29 and 30). Similarly, Alternatives 3 and 6 preserved

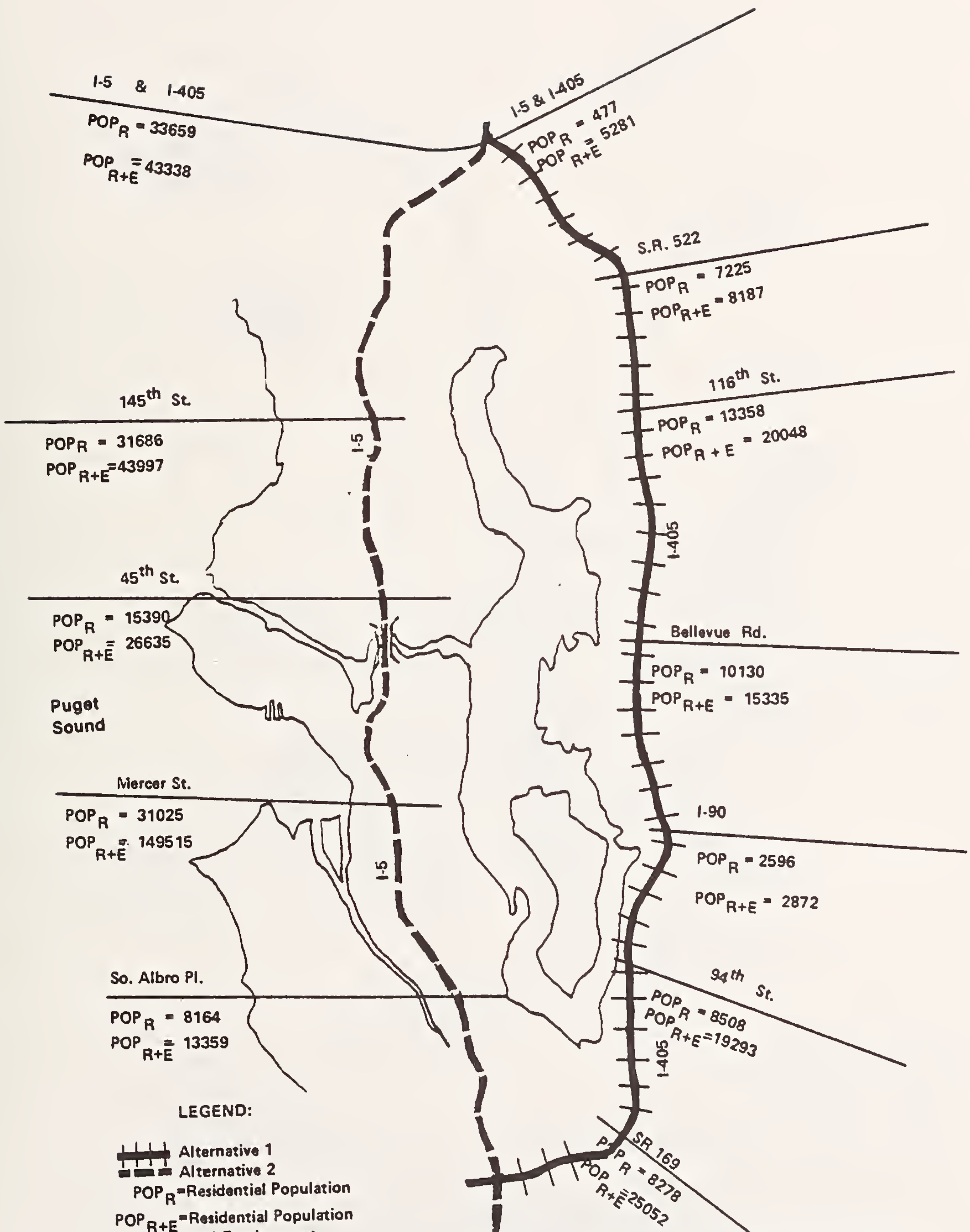

FIGURE 23: POTENTIAL CONSEQUENCES ON ALTERNATIVE THROUGH ROUTES

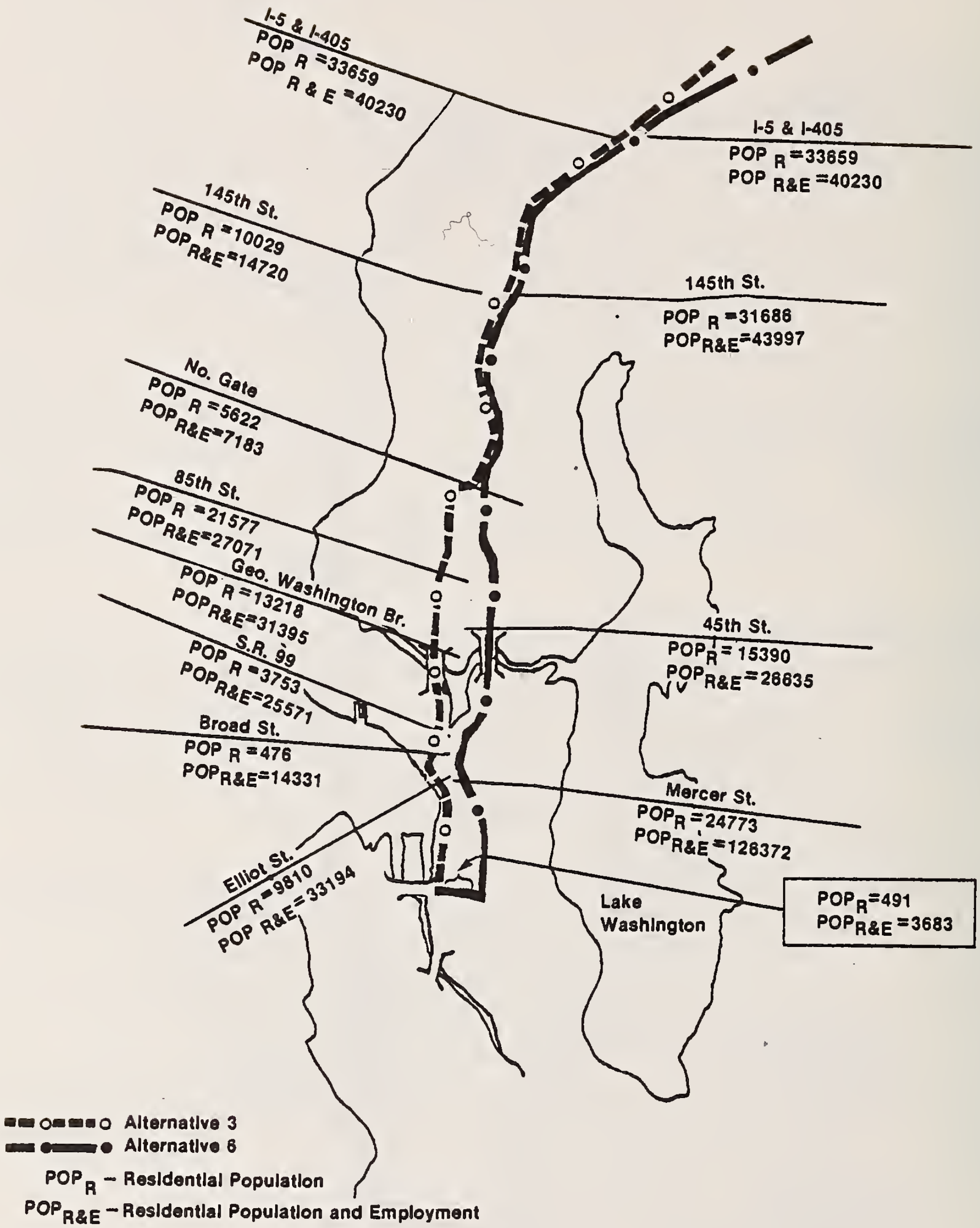

FIGURE 24 : POTENTIAL CONSEQUENCES ON ALTERNATIVE LOCAL ROUTES ALTERNATIVES 3 AND 6

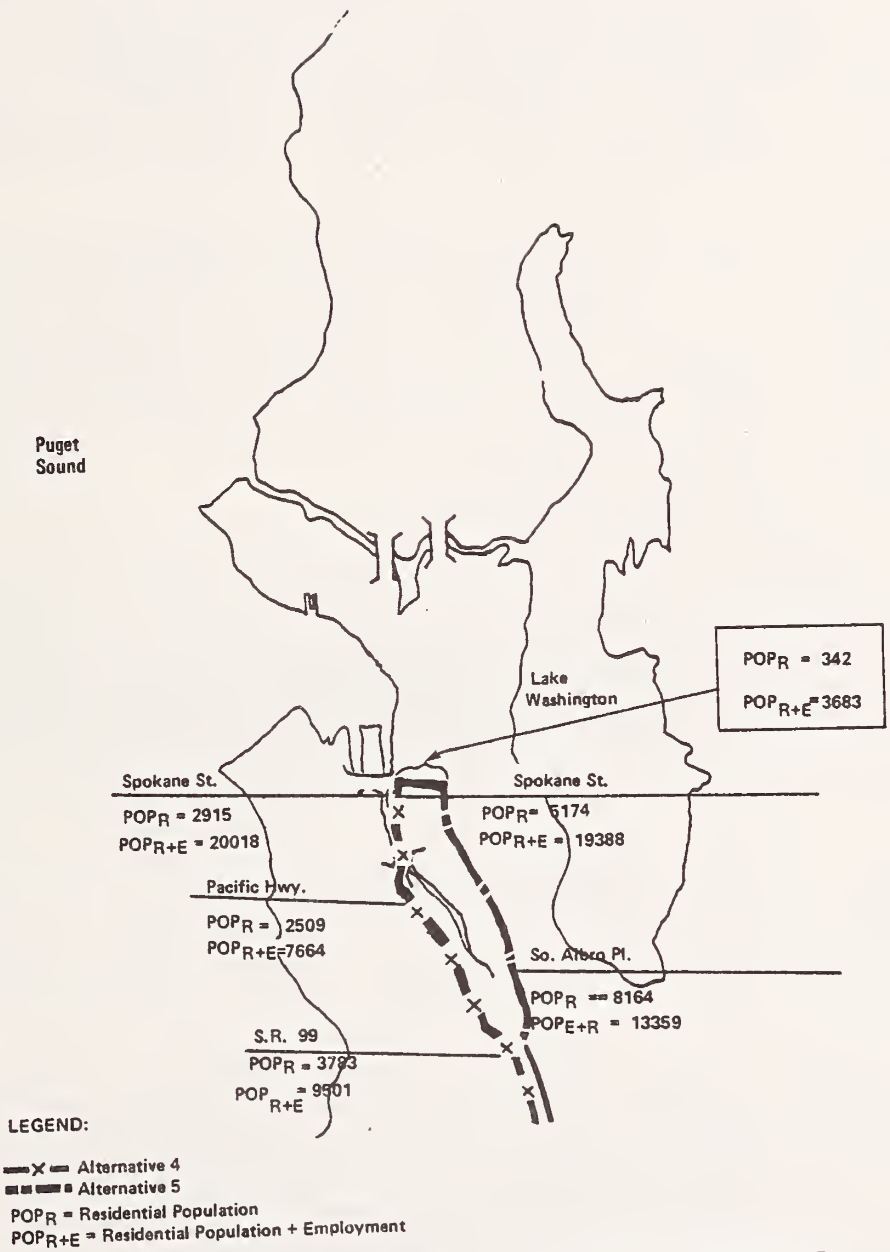

FIGURE 25: POTENTIAL CONSEQUENCES ON ALTERNATIVE LOCAL ROUTES
ALTERNATIVES 4 AND 5

the same relative risk relationships when employment was added. Alternatives 4 and 5, however, reversed their relative risks when employment was introduced. This is because of the heavily industrialized nature of the area through which Alternative 4 passes, and the roughly fivefold increase in risk when employment is added compared with the less than threefold increase on Alternative 5 under similar circumstances. Tables 28 and 29 summarize the risk values for population only and for population plus employment, respectively.

The through routing differentials are great enough to make I-405 (Alternative 1) the preferred route on the basis of the risk calculations alone. The local routings were not definitive, however, and the calculated risk values for Alternatives 3 and 6 were extremely close. Alternatives 4 and 5 exhibited a major risk difference when employment was considered but showed the opposite relationship when the calculations were based on population alone.

PSCOG Reaction to the Methodology

The application of the risk methodology was well received by PSCOG. The calculated risk values generally confirmed the prior routing judgments of persons knowledgeable about the area, although additional subjective criteria made one local routing appear less attractive than the relative risk values implied; a difficult turn and extremely busy intersection on Alternative 5 led one of the participants to conclude that this route was less preferable to Alternative 4, even though the population-plus-employment risk value was higher.

Lack of pilot test time prevented the performing agency from applying additional subjective criteria to the routing alternatives. The participants identified other subjective criteria which may be applied at a later date, including emergency response capability and time-of-day traffic patterns.

As discussed above, PSCOG changed the consequence methodology to include employment land-use patterns as well as residential activities. The risk methodology proved flexible enough to incorporate this change without major modifications in the structure of the analysis or the underlying assumptions. Other modifications discussed included stratifying the accident rates by daytime and nighttime, and calculating the risk values on the hypothesized daytime populations versus the nighttime populations. The methodology is well-suited to incorporate this change too, but the resource requirements may preclude the use of this modified technique on all but a few routes.

TABLE 29
ALTERNATIVES COMPARISON FOR RESIDENTIAL POPULATION

Alternative	Length (miles)	Risk (x 10^{-6})	Total Exposed
1	30.3	6.06	54,873
vs.			
2	28.2	29.71	119,924
3	20.5	24.77	98,144
vs.			
6	20.7	25.52	105,959
4	8.7	1.67	9,207
vs.			
5	7.8	2.20	13,680

TABLE 30
ALTERNATIVES COMPARISON FOR RESIDENTIAL
POPULATION AND EMPLOYMENT

Alternative	Length (miles)	Risk (x 10^{-6})	Total Exposed
1	30.3	11.70	96,068
vs.			
2	28.2	68.68	276,844
3	20.5	50.57	193,695
vs.			
6	20.7	53.67	244,025
4	8.7	10.01	37,183
vs.			
5	7.8	6.07	36,430

Level-of-Effort

The pilot test required about 42 person-hours to evaluate 120 miles of roadway (of which 30 miles overlapped). The major time requirement was for data collection (requiring 16 person-hours), followed by the consequence measurements (10 person-hours) and segmenting the routes (6 person-hours). The other activities required the following levels of effort:

- stating objectives and identifying alternatives (3 person-hours);
- developing work plan (2 person-hours);
- calculating accident probabilities (3 person-hours); and
- calculating risk and discussing findings (2 person-hours).

Because of resource constraints, the participants chose to defer a detailed analysis of the results until a future date. The risk analysis only briefly used subjective criteria, and property was not used as a consequence measure. Additional time requirements to incorporate these activities into the evaluation would probably require 20 to 40 person-hours.

The contractor's presence at the test site was helpful but not essential. Assistance was limited largely to an initial structuring of the problem and some fairly minor suggestions on how to calculate accident probabilities and develop consequence values. The staff member performing the bulk of the analysis felt that there was little or no need for outside help and that the methodology was clearly stated and readily understandable. This individual received his Master's Degree in Political Science and had previous experience with the concept of risk analysis. Although he had no previous knowledge of traffic engineering, he clearly understood those parts of the methodology relative to accident rates and their calculations. In addition, the analyst had acquired a helpful publication from the Washington State Highway Department which provided formulas for calculating accident rates.

Anticipated Use of Risk Analysis

It was not clear at the conclusion of the pilot test how PSCOG would integrate the findings from the risk analysis into its overall hazardous materials study mandate. The agency did feel that the risk methodology provided good insights into issues to be considered when routing hazardous materials and that it was well suited to public presentation because it was easy to understand. PSCOG does not have the authority to implement any policies but can only make recommendations to the appropriate City, County, and State officials. The agency indicated a desire to conduct additional risk analyses throughout the four-county region and was sensitive to the political, social, and economic implications of any routing recommendations.

SUMMARY

This section presented the results of pilot testing the hazardous materials route selection methodology in Nashville and Seattle. The methodology was well received, and its products were acceptable to the performing agencies.

Based on the pilot test results, the study concludes that the risk methodology presented in Sections 1 through 4 has merit and appears to fill an information need that many cities may have. From the contractor's experiences in Nashville and Seattle, the study also concludes that a user-oriented guide is warranted to provide a simplified presentation of the methodology. An abbreviated user's guide would likely enjoy better distribution than the final report and would be of service to many communities concerned with hazardous materials transportation.

APPENDIX A

DEFINITIONS OF CLASSES OF HAZARDOUS MATERIALS

This appendix has been abstracted from a U.S. DOT publication entitled "Hazardous Materials Definitions." It was published in January 1979 and is available from the Materials Transportation Bureau.

EXPLOSIVES

An Explosive - Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified in Parts 170-189. (Sec. 173.50)*

CLASS A EXPLOSIVE	Detonating or otherwise of maximum hazard. The nine types of Class A explosives are defined in Sec. 173.53.
CLASS B EXPLOSIVE	In general, function by rapid combustion rather than detonation and include some explosive devices such as special fireworks, flash powders, etc. Flammable hazard. (Sec. 173.88)
CLASS C EXPLOSIVE	Certain types of manufactured articles containing Class A or Class B explosives, or both, as components but in restricted quantities, and certain types of fireworks. Minimum hazard. (Sec. 173.100)
BLASTING AGENTS	A material designed for blasting which has been tested in accordance with Sec. 173.114a(b) and found to be so insensitive that there is very little probability of accidental initiation to explosion or of transition from deflagration to detonation. (Sec. 173.114a(a))

FLAMMABLE, COMBUSTIBLE, AND PYROPHORIC LIQUIDS

FLAMMABLE LIQUID	Any liquid having a flash point below 100°F. as determined by tests listed in Sec. 173.115(d). Exceptions are listed in Sec.173.115(a).
COMBUSTIBLE LIQUID	Any liquid having a flash point above 100°F. and below 200°F. as determined by tests listed in Sec. 173.115(d). Exceptions to this are found in Sec. 173.115(b).

Pyrophoric Liquid- Any liquid that ignites spontaneously in dry or moist air at or below 130°F. (Sec. 173.115(c))

*Refers to a section in the Code of Federal Regulations.

COMPRESSED GASES

<u>Compressed Gas</u> - Any material or mixture having in the container a pressure <u>exeeding</u> 40 psia at 70°F., or a pressure exceeding 104 psia at 130°F.; or any liquid flammable material having a vapor pressure exceeding 40 psia at 100°F. (Sec. 173.300(a))

<u>FLAMMABLE GAS</u>	Any compressed gas meeting the requirements for lower flammability limit, flammability limit range, flame projection, or flame propagation criteria as specified in Sec. 173.300(b).
<u>NONFLAMMABLE GAS</u>	Any compressed gas other than a flammable compressed gas.

FLAMMABLE SOLIDS, OXIDIZERS AND ORGANIC PEROXIDES

<u>FLAMMABLE SOLID</u>	Any solid material, other than an explosive, which is liable to cause fires through friction, retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious transportation hazard. (sec. 173.150)
<u>OXIDIZER</u>	A substance such as chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter. (See Sec. 173.151)
<u>ORGANIC PEROXIDE</u>	An organic compound containing the bivalent -0-0 structure and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals must be classed as an organic peroxide unless--(See Sec. 173.151(a) for details)

CORROSIVE MATERIALS

<u>CORROSIVE MATERIAL</u>	Any liquid or solid that causes visible destruction of human skin tissue or a liquid that has a severe corrosion rate on steel. (See Sec. 173.240(a) and (b) for details)

POISONOUS MATERIALS, ETIOLOGIC AGENTS, AND RADIOACTIVE MATERIALS

POISON A — Extremely Dangerous Poisons - Poisonous gases or liquids of such nature that a very small amount of the gas, or vapor of the liquid, mixed with air is dangerous to life. (Sec. 173.326)

POISON B — Less Dangerous Poisons - Substances, liquids, or solids (including pastes and semi-solids), other than Class A or irritating materials, which are known to be so toxic to man as to afford a hazard to health during transportation; or which, in the absence of adequate data on human toxicity, are presumed to be toxic to man. (Sec. 173.343)

IRRITATING MATERIAL — A liquid or solid substance which upon contact with fire or when exposed to air gives off dangerous or intensely irritating fumes, but not including any poisonous material, Class A. (Sec. 173.381)

ETIOLOGIC AGENT — An "etiologic agent" means a viable micro-organism, or its toxin which causes or may cause human disease. (Sec. 173.386)(Refer to the Department of Health, Education and Welfare Regulations, Title 42, CFR, Sec. 72.25(c) for details.)

RADIOACTIVE MATERIAL — Any material, or combination of materials, that spontaneously emits ionizing radiation, and having a specific activity greater than 0.002 microcuries per gram. (Sec. 173.389) NOTE: See Sec. 173.389(a) through (1) for details.

ORM-A, B or C (Other Regulated Materials) - Any material that does not meet the definition of a hazardous material, other than a Combustible liquid in packagings having a capacity of 110 gallons or less, and is specified in Sec. 172.101 as an ORM material or that possesses one or more of the characteristics described in ORM-A through D below. (sec. 173.500)
NOTE: An ORM with a flash point of 100°F. to 200°F., when transported with more than 110 gallons in one container shall be classed as a combustible liquid.

OTHER REGULATED MATERIALS

ORM-A — A material which has an anesthetic, irritating, noxious, toxic, or other similar property and which can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation. (Sec. 173.500(a)(1))

ORM-B — A material (including a solid when wet with water) capable of causing significant damage to a transport vehicle or vessel from leakage during transportation. Materials meeting one or both of the following criteria are ORM-B materials: (i) A liquid substance that has a corrosion rate exceeding 0.250 inch per year (IPY) on aluminum (nonclad 7075-T6) at a test temperature of 130°F. An acceptable test is described in NACE Standard TM-01-69, and (ii). Specifically designated by name in Sec. 172.101. (Sec. 173.500 (a)(2))

ORM-C — A material which has other inherent characteristics not described as an ORM-A or ORM-B but which make it unsuitable for shipment, unless properly identified and prepared for transportation. Each ORM-C material is specifically named in Sec. 172.101. (Sec. 173.500(a)(4))

ORM-D — A material such as a consumer commodity which, though otherwise subject to the regulations of this subchapter, presents a limited hazard during transportation due to its form, quantity, and packaging. They must be materials for which exceptions are provided in Sec. 172.101. A shipping description applicable to each ORM-D material or category of ORM-D materials is found in Sec. 172.101. (Sec. 173.500(a)(4))

APPENDIX B

MATERIALS TRANSPORTATION BOARD
HAZARDOUS MATERIALS INCIDENTS REPORTS
BETWEEN JULY 1973 AND DECEMBER 1978
(PLUS SELECTED BUREAU OF MOTOR CARRIER
SAFETY REPORTS NOT INCLUDED IN THE MTB DATA)

Note: Reports identified with a dot in the left-hand margin report the same accident more than once, and the duplicates were eliminated when the hazardous materials accident frequency distributions were developed for Table 12 on page 59.

INCIDENTS INVOLVING VEHICULAR ACCIDENTS DURING JULY 1973 THRU DECEMBER 1978

REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
7070737H	ATLANTA	GA	77/06/29	ORM B NOS	ORM-B	0	0	0	17E	110 GAL	22	0	5	H-H
7070737G	ATLANTA	GA	77/06/29	ORM B NOS	ORM-B	0	0	0	34	80 GAL	22	0	5	H-H
8061225A	LITTLE ROCK	AR	78/06/02	ASPHALT	ORM-C	0	0	966	TANK TRL	1932 GAL	22	0	5	H-H
8080233A	ZUNI	NM	78/07/31	ASPHALT	ORM-C	0	0	0	TANK TRL	5 GAL	22	0	5	H-H
8101334A	DEATH VALLEY	CA	78/10/05	CONSUMER COMMODITY	ORM-D	0	0	0	BOTL GLS	1381 GAL	17	0	6	H-P
6070031A	GREEN RIVER	UT	76/06/15	ASPHALT CUT BACK	COMB L	0	0	32,000	MC306	4500 GAL	22	0	5	H-H
6070584A	HEAWASSEE	GA	76/07/07	ASPHALT CUT BACK	COMB L	0	0	12,000	TANK TRL	6000 GAL	22	0	5	H-H
6110847A	READINGTON	NJ	76/11/22	ASPHALT CUT BACK	COMB L	0	3	7,756	TANK TRL	5378 GAL	22	0	5	H-H
7060522A	SKOOKUNCHK CN	ZZ	77/05/26	ASPHALT CUT BACK	COMB L	0	0	2,000	TANK TRL	49360 LBS	22	0	5	H-H
6080527A	ALTUS	OK	76/07/28	ASPHALT CUT BACK	COMB L	0	0	2,000	TANK TRL	4000 GAL	22	0	5	H-H
8040226A	SILVER CREEK	NY	78/03/21	ASPHALT CUT BACK	COMB L	0	0	45,000	MC306	3500 GAL	22	0	5	H-H
8051564A	WYNNE	AR	78/04/26	ASPHALT CUT BACK	COMB L	0	0	290	TANK TRL	1936 GAL	22	0	5	H-H
8110318A	ROSWELL	NM	78/10/13	ASPHALT CUT BACK	COMB L	0	0	1,376	TANK TRL	6500 GAL	22	0	5	H-H
8101270A	GRUNDY	VA	78/10/17	ASPHALT CUT BACK	COMB L	0	0	1,700	TANK TRL	5000 GAL	22	0	5	H-H
7030575A	LOVE COUNTY	OK	77/02/18	ASPHALT CUT BACK	COMB L	0	0	19,000	MC306	1907 GAL	22	0	5	H-P
7110903A	PHILLIP	SD	77/11/03	ASPHALT CUT BACK	COMB L	0	0	1,000	TANK TRL	4000 GAL	22	0	5	H-P
7071372A	HAXTUN	CO	77/07/13	ASPHALT CUT BACK	COMB L	0	0	0	TANK TRL	3500 GAL	22	0	5	H-P
8061581A	MOSELLE	MS	78/06/14	COAL TAR DISTILL CL	COMB L	0	0	1,700	TANK TRL	1000 GAL	22	0	5	H-H
8060813A	LINCOLN	AL	78/05/31	COAL TAR NAPHTHA CL	COMB L	0	0	350	TANK TRL	500 GAL	22	0	5	H-H
5090544A	GORDENSVILLE	VA	75/09/11	COMBUSTIBLE LIQ NOS	COMB L	0	0	932	TANK TRK	0	17	0	5	H-H
6020201A	SHIPROCK	NM	76/01/08	COMBUSTIBLE LIQ NOS	COMB L	0	0	22,788	MC306	2505 GAL	2	22	5	H-H
6020457A	WARSAW	NC	76/02/04	COMBUSTIBLE LIQ NOS	COMB L	0	0	4,000	MC305	3568 GAL	22	0	5	H-H
6020020A	COLBY	KS	76/01/05	COMBUSTIBLE LIQ NOS	COMB L	0	0	256	TANK TRL	1194 GAL	22	0	5	H-H
•6020493A	WINSLOW	AZ	76/01/27	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,500	MC306	3700 GAL	22	0	5	H-H
6010784A	ROBBINS	TN	76/01/16	COMBUSTIBLE LIQ NOS	COMB L	0	0	17,000	MC306	5400 GAL	22	0	5	H-H
5070811A	DECATUR	AL	75/07/13	COMBUSTIBLE LIQ NOS	COMB L	0	0	10,000	TANK TRL	0	17	0	5	H-H
•6020493B	WINSLOW	AZ	76/01/27	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,500	MC306	3700 GAL	22	0	5	H-H
5060624A	W MEMPHIS	AR	75/06/07	COMBUSTIBLE LIQ NOS	COMB L	0	0	361	MC305	0	17	0	5	H-H
6020546Z	BARKER	NY	76/02/05	COMBUSTIBLE LIQ NOS	COMB L	0	0	0	TANK TRK	0	2	0	1	H-H
6020577A	IDAHO FALLS	ID	76/01/17	COMBUSTIBLE LIQ NOS	COMB L	0	0	5,550	MC302	3100 GAL	22	0	5	H-H
5040755A	URAVAN	CO	75/03/25	COMBUSTIBLE LIQ NOS	COMB L	0	0	30,000	MC305	0	17	0	5	H-H
6020577B	IDAHO FALLS	ID	76/01/17	COMBUSTIBLE LIQ NOS	COMB L	0	0	5,550	MC305	3600 GAL	22	0	5	H-H
6010635A	NAPERVILLE	IL	76/01/20	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,500	TANK TRL	7100 GAL	22	0	5	H-H
5040504A	QUINCY	CA	75/04/08	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,000	MC305	0	2	17	5	H-H
6020657A	SHULLSBURG	WI	76/01/12	COMBUSTIBLE LIQ NOS	COMB L	0	0	585	MC305	1947 GAL	22	0	5	H-H
6020668A	CLIFTON	AZ	76/02/12	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,600	MC305	7200 GAL	2	22	5	H-H
6020701A	FREDERICK	MD	76/02/06	COMBUSTIBLE LIQ NOS	COMB L	0	0	400	MC305	2500 GAL	22	0	5	H-H
6010593A	DOUGLAS	WY	76/01/14	COMBUSTIBLE LIQ NOS	COMB L	0	0	275	MC305	943 GAL	2	22	5	H-H
6030367A	RADFORD	VA	76/03/08	COMBUSTIBLE LIQ NOS	COMB L	0	0	3,250	TANK TRL	6500 GAL	22	0	5	H-H
4120548A	LAKEFIELD	MN	74/12/17	COMBUSTIBLE LIQ NOS	COMB L	0	0	45,000	MC306	0	2	0	5	H-H
4120288A	BESSEMER	AL	74/12/08	COMBUSTIBLE LIQ NOS	COMB L	1	0	17,300	TANK TRL	0	7	17	6	H-H
4120019A	HILL CITY	SD	74/11/23	COMBUSTIBLE LIQ NOS	COMB L	0	0	3,000	TANK TRL	0	2	0	5	H-H
4110792A	SHEFFIELD	AL	74/11/13	COMBUSTIBLE LIQ NOS	COMB L	0	0	47,000	TANK TRL	0	2	17	5	H-H
6030461A	BOULDER DAM	AZ	76/02/21	COMBUSTIBLE LIQ NOS	COMB L	0	0	456	MC306	1426 GAL	22	0	5	H-H
4110617A	SIOUX FALLS	SD	74/11/15	COMBUSTIBLE LIQ NOS	COMB L	0	0	15,000	MC306	0	17	0	5	H-H
4110519B	DIXON	MT	74/11/12	COMBUSTIBLE LIQ NOS	COMB L	0	0	0	MC302	0	2	17	5	H-H
6030461B	BOULDER DAM	AZ	76/02/21	COMBUSTIBLE LIQ NOS	COMB L	0	0	456	MC306	1426 GAL	22	0	5	H-H
6030967A	FORT RUCKER	AL	76/03/22	COMBUSTIBLE LIQ NOS	COMB L	0	0	0	TANK TRK	10 GAL	2	22	5	H-H
6040273A	ALEXANDRIA	VA	76/04/06	COMBUSTIBLE LIQ NOS	COMB L	0	0	45,000	MC306	257 GAL	22	0	5	H-H
6050370A	SPARTANBURG	SC	76/04/23	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,549	TANK TRK	3800 GAL	22	0	5	H-H

RECORDS ARE SORTED BY CLASS AND COMMODITY CODES

INCIDENTS INVOLVING VEHICULAR ACCIDENTS DURING JULY 1973 THRU DECEMBER 1978

REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
6040351A	KNG OF PRUSIA	PA	76/04/07	COMBUSTIBLE LIQ NOS	COMB L	0	0	600	MC304	1100 GAL	22	0	5	H-H
6040367A	KEMMERER	WY	75/11/26	COMBUSTIBLE LIQ NOS	COMB L	0	0	288	MC302	1000 GAL	22	0	5	H-H
6040388A	CALEDONIA	WI	76/03/23	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,500	MC306	980 GAL	22	0	5	H-H
6040842A	CADDO	AL	76/04/16	COMBUSTIBLE LIQ NOS	COMB L	0	0	280	TANK TRK	942 GAL	22	0	5	H-H
6010160A	COMO	CO	75/12/20	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,546	MC306	6700 GAL	2	22	5	H-H
6050041A	AKRON	OH	76/04/10	COMBUSTIBLE LIQ NOS	COMB L	0	0	3,000	MC306	8700 GAL	22	0	6	H-H
6010292A	DUPREE	SD	75/12/23	COMBUSTIBLE LIQ NOS	COMB L	0	0	0	MC306	3500 GAL	22	0	5	H-H
6050220A	NORFOLK	VA	76/04/24	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,950	MC305	300 GAL	22	0	5	H-H
6050228A	LAKE CITY	FL	76/04/28	COMBUSTIBLE LIQ NOS	COMB L	0	0	15,000	MC302	6500 GAL	2	22	5	H-H
6050236A	AVENEL	NJ	76/04/19	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,000	MC306	25 GAL	2	22	5	H-H
6050777A	FOREST	MS	76/05/05	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,800	MC306	3894 GAL	22	0	5	H-H
7111062A	MONROEVILLE	AL	77/11/18	COMBUSTIBLE LIQ NOS	COMB L	0	0	400	MC306	900 GAL	2	22	5	H-H
7110782A	KILGORE	TX	77/10/18	COMBUSTIBLE LIQ NOS	COMB L	0	0	4,000	MC305	32440 LBS	2	22	5	H-H
6090605A	W GOSHEN	PA	76/09/01	COMBUSTIBLE LIQ NOS	COMB L	0	0	10,000	TANK TRL	6100 GAL	3	22	5	H-H
6100092A	LEICESTER	NY	76/09/08	COMBUSTIBLE LIQ NOS	COMB L	0	0	160	MC306	400 GAL	22	0	5	H-H
8040139A	CHARLOTTE	NC	78/03/23	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,185	MC306	384 GAL	22	0	5	H-H
7090468B	WENDOVER	UT	77/09/01	COMBUSTIBLE LIQ NOS	COMB L	0	0	12,500	MC306	2500 GAL	22	0	5	H-H
7090468A	WENDOVER	UT	77/09/01	COMBUSTIBLE LIQ NOS	COMB L	0	0	12,500	MC305	2500 GAL	22	0	5	H-H
6050597B	ELKHART	KS	76/05/03	COMBUSTIBLE LIQ NOS	COMB L	0	0	17,032	MC306	3342 GAL	22	0	6	H-H
6070177A	CONCORDVILLE	PA	76/06/24	COMBUSTIBLE LIQ NOS	COMB L	0	0	3,250	TANK TRL	6500 GAL	22	0	5	H-H
8030604A	CARLISLE	PA	78/02/28	COMBUSTIBLE LIQ NOS	COMB L	0	0	5	MC304	10 GAL	22	0	5	H-H
8090465A	POTTS CAMP	MS	78/08/29	COMBUSTIBLE LIQ NOS	COMB L	0	0	15,000	TANK TRL	6500 GAL	22	0	5	H-H
4050026A	BATON ROUGE	LA	74/04/15	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,500	TANK TRL	0	17	0	5	H-P
6060745B	WESTERNVILLE	NY	76/05/20	COMBUSTIBLE LIQ NOS	COMB L	0	0	500	MC306	15 GAL	22	0	5	H-P
4050198A	BELLE PLAINE	IA	74/04/30	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,500	TANK TRL	0	17	0	5	H-P
4050263A	HURRICAINE	UT	74/03/27	COMBUSTIBLE LIQ NOS	COMB L	0	0	20,000	TANK TRL	0	2	17	5	H-P
6050910A	PITTSBURGH	PA	76/05/13	COMBUSTIBLE LIQ NOS	COMB L	0	0	5,000	TANK TRK	13 GAL	22	0	5	H-P
5020293A	BALTIMORE	MD	75/01/30	COMBUSTIBLE LIQ NOS	COMB L	0	0	7,000	MC306	0	17	0	5	H-P
6050667A	PINE BLUFF	AR	76/05/06	COMBUSTIBLE LIQ NOS	COMB L	0	0	4,500	TANK TRK	3059 GAL	22	0	5	H-P
5020414A	LYNDEN	WA	75/02/10	COMBUSTIBLE LIQ NOS	COMB L	0	0	4,000	MC306	0	10	17	5	H-P
6050299A	HYDEN	KY	76/04/23	COMBUSTIBLE LIQ NOS	COMB L	0	0	24,315	TANK TRL	4000 GAL	22	0	5	H-P
6040864A	BIRMINGHAM	AL	76/04/12	COMBUSTIBLE LIQ NOS	COMB L	0	0	3	TANK TRK	3 GAL	22	0	5	H-P
6040540A	BELFIELD	ND	76/04/02	COMBUSTIBLE LIQ NOS	COMB L	0	0	190	MC306	378 GAL	2	22	5	H-P
6040170Z	BALTIMORE	MD	76/03/31	COMBUSTIBLE LIQ NOS	COMB L	0	0	0	TANK TRK	0	22	24	1	H-P
5030029A	CASTLE ROCK	WA	75/02/19	COMBUSTIBLE LIQ NOS	COMB L	0	0	10,000	MC306	0	2	17	5	H-P
6030344A	WILMINGTON	CA	76/02/28	COMBUSTIBLE LIQ NOS	COMB L	0	0	300	TANK TRL	700 GAL	22	0	5	H-P
6030322A	E GREENBUSH	NY	75/11/14	COMBUSTIBLE LIQ NOS	COMB L	0	0	16,100	MC306	2200 GAL	2	22	5	H-P
6020820A	HICKSVILLE	NY	76/02/16	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,000	TANK TRK	50 GAL	22	0	5	H-P
6020781A	WINNEMUCCA	NV	76/01/13	COMBUSTIBLE LIQ NOS	COMB L	0	0	30,000	TANK TRK	5655 GAL	22	0	5	H-P
6020615A	COKEVILLE	WY	76/02/10	COMBUSTIBLE LIQ NOS	COMB L	0	0	12,500	TANK TRK	5900 GAL	22	0	5	H-P
6020589A	PURDY	WA	76/01/31	COMBUSTIBLE LIQ NOS	COMB L	0	0	38	TANK TRL	300 GAL	22	0	5	H-P
5060043A	WOLF POINT	MT	75/05/20	COMBUSTIBLE LIQ NOS	COMB L	0	0	115	MC306	0	17	0	5	H-P
6020499A	E TEXAS	PA	76/02/02	COMBUSTIBLE LIQ NOS	COMB L	0	0	800	MC306	50 GAL	22	0	5	H-P
6020200A	BENTON CITY	WA	76/01/21	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,000	TANK TRK	378 GAL	22	0	5	H-P
5070159A	ARLINGTON	TX	75/06/21	COMBUSTIBLE LIQ NOS	COMB L	0	0	8,000	MC305	0	2	17	5	H-P
5120502A	BALTIMORE	MD	75/12/03	COMBUSTIBLE LIQ NOS	COMB L	0	0	0	TANK TRL	0	2	0	5	H-P
6020115A	SMYRNA	NY	76/01/23	COMBUSTIBLE LIQ NOS	COMB L	0	0	100	MC306	87 GAL	22	0	5	H-P
6020092A	TRYON	NC	76/01/14	COMBUSTIBLE LIQ NOS	COMB L	0	0	5,000	TANK TRL	1240 GAL	2	22	5	H-P
5120551A	NEWFOLDEN	MN	75/12/06	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,415	TANK TRL	0	17	0	5	H-P
6020091A	DETROIT	MI	76/01/12	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,000	TANK TRL	1 GAL	2	22	5	H-P

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6020014A	GRAFTON	MA	76/01/16	COMBUSTIBLE LIQ NOS	COMB L	0	0	50	MC306	50 GAL	2	22	5	H-P
6010618A	BEAVER FALLS	PA	76/01/16	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,500	MC306	3800 GAL	2	22	5	H-P
7081240A	LIBERTY HILL	TX	77/08/15	COMBUSTIBLE LIQ NOS	COMB L	0	0	2,000	MC305	1500 GAL	22	0	5	H-P
7100307A	LIBERTY	MS	77/09/28	COMBUSTIBLE LIQ NOS	COMB L	0	0	3,600	TANK PRT	770 GAL	22	0	5	H-P
8071690A	BEREA	OH	78/07/05	COMBUSTIBLE LIQ NOS	COMB L	0	0	10,000	MC306	150 GAL	22	0	5	H-P
8040568A	WYOMING	IL	78/04/04	COMBUSTIBLE LIQ NOS	COMB L	0	0	30,000	TANK TRL	6900 GAL	22	0	5	H-P
8030662A	ALBANY	NY	78/03/07	COMBUSTIBLE LIQ NOS	COMB L	0	0	18,850	TANK TRL	7700 GAL	2	22	5	H-P
8020277A	GOSHEN	VA	78/01/24	COMBUSTIBLE LIQ NOS	COMB L	0	0	1,600	TANK TRL	2500 GAL	22	0	5	H-P
7061434A	BEAUMONT	TX	77/06/10	COMP LAQ,PNT RM CL	COMB L	0	0	500	MC304	100 GAL	22	0	5	H-H
8051074A	SAND HILL	MS	78/05/01	CRUDE OIL PETROL	COMB L	0	0	1,500	TANK TRL	550 GAL	22	0	5	H-H
•7020072A	MILLIS	WY	77/01/22	CRUDE OIL PETROL	COMB L	0	0	600	MC306	344 GAL	22	0	5	H-H
•7020072B	MILLIS	WY	77/01/22	CRUDE OIL PETROL	COMB L	0	0	600	MC306	344 GAL	22	0	5	H-H
7110348A	RIVERSIDE	WY	77/10/14	CRUDE OIL PETROL	COMB L	0	0	1,632	MC306	4707 GAL	22	0	5	H-P
8020193A	SHIPROCK	NM	78/01/20	CRUDE OIL PETROL	COMB L	0	0	56	MC306	42 GAL	2	22	5	H-P
7120928A	LANDER	WY	77/12/08	CRUDE OIL PETROL	COMB L	0	0	1,000	MC311	2520 GAL	22	0	5	H-P
7010327A	CHILDERSBURG	AL	77/01/04	FUEL OIL	COMB L	0	0	0	TANK TRL	2000 GAL	22	0	5	H-H
8020047A	ACKERMAN	MS	78/01/20	FUEL OIL	COMB L	0	0	1,300	MC305	2248 GAL	22	0	5	H-H
7010409A	SHELL ROCK	IA	76/12/09	FUEL OIL	COMB L	0	0	350	MC305	700 GAL	22	0	5	H-H
7010456A	PRAGUE	OK	77/01/03	FUEL OIL	COMB L	0	0	0	TANK TRK	6500 GAL	22	0	5	H-H
6120797A	TOBYHANNA	PA	76/12/20	FUEL OIL	COMB L	0	0	10,000	TANK TRL	3739 GAL	22	0	5	H-H
7010509A	CRESTON	IA	76/12/28	FUEL OIL	COMB L	0	0	2,000	MC305	2500 GAL	22	0	5	H-H
8030560A	BONHAM	TX	78/02/28	FUEL OIL	COMB L	0	0	0	TANK TRL	2500 GAL	22	0	5	H-H
6100089A	MEMPHIS	TN	76/09/16	FUEL OIL	COMB L	0	0	1,155	MC306	2600 GAL	22	0	5	H-H
6120536A	JESSUP	IA	76/11/19	FUEL OIL	COMB L	0	0	25,000	MC305	1300 GAL	22	0	5	H-H
7010753A	BURLINGTON	CO	77/01/09	FUEL OIL	COMB L	0	0	100	MC307	200 GAL	22	0	5	H-H
7010765A	LOUISVILLE	KY	77/01/20	FUEL OIL	COMB L	0	0	800	TANK TRL	1975 GAL	22	0	5	H-H
7071463A	LEXINGTON	AL	77/07/12	FUEL OIL	COMB L	0	0	0	TANK TRL	8133 GAL	22	0	5	H-H
8030584A	CHICAGO	IL	78/02/04	FUEL OIL	COMB L	0	0	9,320	TANK TRL	6000 GAL	22	0	5	H-H
7010773A	VICKSBURG	MS	77/01/21	FUEL OIL	COMB L	0	0	100	TANK TRL	10 GAL	22	0	5	H-H
8020717A	S YELLVILLE	AR	78/02/06	FUEL OIL	COMB L	0	0	3,000	MC300	8000 GAL	22	0	5	H-H
6120409A	SHELL ROCK	IA	76/12/09	FUEL OIL	COMB L	0	0	584	TANK TRL	689 GAL	22	0	5	H-H
6110590A	BUTTONWILLOW	CA	76/11/09	FUEL OIL	COMB L	0	0	5,000	MC302	4463 GAL	22	0	5	H-H
7091401A	COLDFOOT	AK	75/12/14	FUEL OIL	COMB L	0	0	22,000	TANK TRL	9000 GAL	22	0	5	H-H
6110553A	CITY UNKNOWN	AK	76/11/01	FUEL OIL	COMB L	0	0	6,000	MC306	6406 GAL	22	0	5	H-H
6070330A	LOUISE	MS	76/07/01	FUEL OIL	COMB L	0	0	0	MC306	934 GAL	22	0	5	H-H
8051443A	PORTLAND	OR	78/05/15	FUEL OIL	COMB L	0	0	11,713	MC306	3570 GAL	22	0	5	H-H
8030790A	SHEFFIELD	PA	78/02/16	FUEL OIL	COMB L	0	0	500	MC302	472 GAL	22	0	5	H-H
7020030A	CITY UNKNOWN	AZ	76/10/12	FUEL OIL	COMB L	0	0	1,750	MC306	3900 GAL	2	22	5	H-H
7020030B	CITY UNKNOWN	AZ	76/10/12	FUEL OIL	COMB L	0	0	1,750	MC305	3900 GAL	2	22	5	H-H
8010673A	SAUNDERS	KS	78/01/12	FUEL OIL	COMB L	0	0	1,250	MC306	2850 GAL	22	0	5	H-H
7120525A	TAPPAHANOCK	VA	77/11/21	FUEL OIL	COMB L	0	0	335	MC306	839 GAL	22	0	5	H-H
8031006A	LAKE WACCAMAW	NC	78/03/09	FUEL OIL	COMB L	0	0	1,000	MC306	50 GAL	22	0	5	H-H
7091456A	FLAGSTAFF	AZ	77/08/12	FUEL OIL	COMB L	0	0	4,000	MC306	8000 GAL	22	0	5	H-H
6110112A	SIDNEY	NE	76/10/12	FUEL OIL	COMB L	0	0	420	MC305	850 GAL	22	0	5	H-H
7070302A	KEARNEY	AZ	77/04/26	FUEL OIL	COMB L	0	0	220	MC307	452 GAL	22	0	5	H-H
7070236A	STALLO	MS	77/06/20	FUEL OIL	COMB L	0	0	900	MC306	1937 GAL	22	0	5	H-H
7120449A	SICAMOUS CN	ZZ	77/11/26	FUEL OIL	COMB L	0	0	10,000	TANK TRL	5000 GAL	22	0	5	H-H
8030501A	NASHVILLE	AR	78/02/28	FUEL OIL	COMB L	0	0	800	MC306	1300 GAL	22	0	5	H-H
7061318A	WHITESBURG	KY	77/06/20	FUEL OIL	COMB L	0	0	2,500	TANK TRL	2000 GAL	2	22	5	H-H
8030500A	JONES MILL	AR	78/03/06	FUEL OIL	COMB L	0	0	2,000	TANK TRL	4000 GAL	22	0	5	H-H

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7020139A	TRENTON	NE	76/09/03	FUEL OIL	COMB L	0	0	1,300	TANK TRL	2700 GAL	2	22	5	H-H
6110021A	MIDDLETOWN	OH	76/10/15	FUEL OIL	COMB L	0	0	600	MC307	2000 GAL	22	0	5	H-H
6071041A	MILWAUKEE	WI	76/06/10	FUEL OIL	COMB L	0	0	440	MC306	75 GAL	3	22	5	H-H
7060254A	MACON	MS	77/05/21	FUEL OIL	COMB L	0	0	867	MC306	1592 GAL	22	0	5	H-H
8010135A	EL DORADO	AR	77/02/24	FUEL OIL	COMB L	0	0	2,100	TANK TRL	5000 GAL	22	0	5	H-H
8050107A	OLD WASHINGTN	OH	78/04/11	FUEL OIL	COMB L	0	0	300	MC306	800 GAL	22	0	5	H-H
8040036A	HICKORY	NC	78/01/18	FUEL OIL	COMB L	0	0	9,200	TANK TRL	5135 GAL	22	0	5	H-H
8040037A	CHARLOTTE	NC	77/12/29	FUEL OIL	COMB L	0	0	1,500	TANK TRL	100 GAL	22	0	5	H-H
8040104A	WESTMINSTER	SC	78/01/15	FUEL OIL	COMB L	0	0	3,000	TANK TRL	4812 GAL	22	0	5	H-H
8010766A	APALACHIN	NY	78/01/14	FUEL OIL	COMB L	0	0	200	MC306	420 GAL	22	0	5	H-H
8020580A	JONES MILL	AR	78/02/05	FUEL OIL	COMB L	0	0	100	TANK TRL	150 GAL	22	0	5	H-H
7050869A	GATESVILLE	NC	77/05/12	FUEL OIL	COMB L	0	0	600	TANK TRL	500 GAL	2	22	5	H-H
7050822A	COUNCE	TN	77/04/26	FUEL OIL	COMB L	0	0	677	TANK TRL	2369 GAL	22	0	5	H-H
8010408A	BARTON	AR	77/07/18	FUEL OIL	COMB L	0	0	5,000	TANK TRL	6600 GAL	22	0	5	H-H
7020424A	MARKS	MS	77/02/02	FUEL OIL	COMB L	0	0	600	MC306	2032 GAL	22	0	5	H-H
7050607A	POCAHONTAS	TN	77/05/05	FUEL OIL	COMB L	0	0	1,277	TANK TRK	4663 GAL	22	0	5	H-H
8011162A	STERLING	CO	77/12/26	FUEL OIL	COMB L	0	0	50	MC306	50 GAL	22	0	5	H-H
7040877A	ARKADELPHIA	AR	77/04/13	FUEL OIL	COMB L	0	0	200,000	TANK TRL	6200 GAL	22	0	4	H-H
6081035A	MARMET	WV	76/08/13	FUEL OIL	COMB L	0	0	20,000	MC305	500 GAL	2	22	5	H-H
6081142A	COMMERCE CITY	CO	76/08/23	FUEL OIL	COMB L	0	0	31,335	MC306	6000 GAL	22	0	5	H-H
7040782A	OTHELLO	WA	76/12/23	FUEL OIL	COMB L	0	0	5,000	MC305	1993 GAL	2	22	5	H-H
7040527A	ALLENDALE	IL	77/03/29	FUEL OIL	COMB L	0	0	700	MC306	1783 GAL	22	0	5	H-H
8020558A	TAMPA	FL	78/02/04	FUEL OIL	COMB L	0	0	30,000	TANK TRL	4500 GAL	2	22	5	H-H
7040248A	BRADLEY JCT	FL	77/03/31	FUEL OIL	COMB L	0	0	500	TANK TRL	700 GAL	19	0	5	H-H
8020764A	BUFFALO	NY	78/02/04	FUEL OIL	COMB L	0	0	5,000	TANK TRK	3200 GAL	22	0	5	H-H
7110506A	STARKE	FL	77/02/21	FUEL OIL	COMB L	0	0	974	MC306	3160 GAL	22	0	5	H-H
7040081A	FINDLAY	OH	77/03/16	FUEL OIL	COMB L	0	0	1,500	TANK TRL	5366 GAL	0	0	5	H-H
6090527A	ENFIELD	NC	76/09/08	FUEL OIL	COMB L	0	0	25,000	TANK TRL	6200 GAL	22	0	5	H-H
7020589A	KRUMSVILLE	PA	77/02/08	FUEL OIL	COMB L	0	0	20	TANK TRL	40 GAL	22	0	5	H-H
8040256A	LESLIE	AR	78/03/22	FUEL OIL	COMB L	0	0	3,000	MC306	7000 GAL	22	0	5	H-H
7020670A	ALBUQUERQUE	NM	77/01/29	FUEL OIL	COMB L	0	0	0	TANK TRL	8000 GAL	2	22	5	H-H
8040494A	PARAGOULD	AR	78/03/22	FUEL OIL	COMB L	0	0	1,500	TANK TRL	3000 GAL	22	0	5	H-H
8010561A	FORT MADISON	IA	77/12/05	FUEL OIL	COMB L	0	0	400	MC305	1000 GAL	22	0	5	H-H
7030362A	WALNUT	MS	77/02/18	FUEL OIL	COMB L	0	0	1,715	MC306	4929 GAL	22	0	5	H-H
8041294A	RIEGLEWOOD	NC	78/04/14	FUEL OIL	COMB L	0	0	0	TANK TRL	6500 GAL	22	0	5	H-H
8041319A	BETHLEHEM	PA	78/04/04	FUEL OIL	COMB L	0	0	10,000	TANK TRL	4500 GAL	22	0	5	H-H
7010322A	KELSO	WA	77/01/04	FUEL OIL	COMB L	0	0	0	TANK TRL	4500 GAL	22	0	5	H-H
8010562A	CRAWFORDSVL	IA	77/12/13	FUEL OIL	COMB L	0	0	400	MC305	1000 GAL	22	0	5	H-H
7030018A	IMBODEN	AR	77/02/15	FUEL OIL	COMB L	0	0	3,000	MC300	7000 GAL	22	0	5	H-H
7030104A	BROUNTOWN	WI	77/02/05	FUEL OIL	COMB L	0	0	1,200	MC305	2400 GAL	2	22	5	H-H
8061112A	WINFIELD	KS	78/06/07	FUEL OIL	COMB L	0	0	2,000	TANK TRK	5202 GAL	22	0	5	H-H
•8110802A	CHARLESTON	SC	78/10/27	FUEL OIL	COMB L	0	0	12,000	TANK TRL	4800 GAL	22	0	5	H-H
8060767A	COLUMBIA	SC	78/04/20	FUEL OIL	COMB L	0	0	25,000	TANK TRK	7400 GAL	22	0	5	H-H
8111271A	WICHITA	KS	78/02/05	FUEL OIL	COMB L	0	0	150	MC306	300 GAL	22	0	5	H-H
8071448A	MANKATO	MN	78/05/24	FUEL OIL	COMB L	0	0	25,000	TANK TRL	3316 GAL	22	0	5	H-H
7030361A	MINISKIRT JCT	TX	77/03/06	FUEL OIL	COMB L	0	0	3,345	TANK TRL	8484 GAL	22	0	5	H-H
8111380A	WARREN	PA	78/11/10	FUEL OIL	COMB L	0	0	1,750	TANK TRL	1769 GAL	22	0	5	H-H
8081537A	LEBANON	PA	78/08/18	FUEL OIL	COMB L	0	0	4,000	MC306	2 GAL	22	0	5	H-H
8060853A	SCHODACK	NY	78/05/27	FUEL OIL	COMB L	0	0	1,500	TANK TRL	1000 GAL	2	22	5	H-H
8101338A	HARRISBURG	AR	78/10/06	FUEL OIL	COMB L	0	0	150	MC300	300 GAL	22	0	5	H-H

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8100566A	DUQUESNE	PA	78/09/08	FUEL OIL	COMB L	0	0	2,500	TANK TRL	250 GAL	22	0	5	H-H
8110373A	CHARLESTN HTS	SC	78/10/17	FUEL OIL	COMB L	0	0	2,000	TANK TRL	5000 GAL	22	0	5	H-H
8090101A	ROCHELLE	IL	78/08/23	FUEL OIL	COMB L	0	0	80	TANK PRT	50 GAL	22	0	5	H-H
8070391A	MYAKKA CITY	FL	78/06/27	FUEL OIL	COMB L	0	0	800	TANK TRL	2000 GAL	22	0	5	H-H
8120864A	CHARLESTON	SC	78/10/17	FUEL OIL	COMB L	0	0	2,000	TANK TRL	5000 GAL	22	0	5	H-H
8120865A	CHARLESTON	SC	78/10/27	FUEL OIL	COMB L	0	0	12,000	TANK TRL	4800 GAL	22	0	5	H-H
8110219A	BRIDGEWATER	NJ	78/10/12	FUEL OIL	COMB L	0	0	1,300	TANK TRL	4250 GAL	22	0	5	H-H
7120658A	LAME DEER	MT	77/12/04	FUEL OIL	COMB L	0	0	0	MC306	4600 GAL	22	0	5	H-P
7020649A	DEARBORN	MI	75/08/19	FUEL OIL	COMB L	0	0	500	TANK TRL	40 GAL	2	22	5	H-P
7020465A	PURDY	WA	76/01/31	FUEL OIL	COMB L	0	0	200	TANK TRL	300 GAL	22	0	5	H-P
7040228A	GUERNSEY	WY	77/03/31	FUEL OIL	COMB L	0	0	4,000	MC305	1000 GAL	22	0	5	H-P
7040043A	INDIO	CA	77/03/06	FUEL OIL	COMB L	0	0	500	TANK TRK	63 GAL	22	0	5	H-P
7030052B	AKERSVILLE	KY	77/02/11	FUEL OIL	COMB L	0	0	1,000	TANK TRK	500 GAL	22	0	2	H-P
6070534A	POCATELLO	ID	76/06/30	FUEL OIL	COMB L	0	0	17	TANK TRL	50 GAL	22	0	5	H-P
7030292A	EL CENTRO	CA	77/03/02	FUEL OIL	COMB L	0	0	1,750	MC306	3500 GAL	2	22	5	H-P
7030292B	EL CENTRO	CA	77/03/02	FUEL OIL	COMB L	0	0	1,750	MC305	3500 GAL	2	22	5	H-P
7010267A	SAVAGE	MT	76/12/17	FUEL OIL	COMB L	0	0	10,000	MC302	4200 GAL	22	0	6	H-P
7020464A	MONTESAN	WA	75/12/14	FUEL OIL	COMB L	0	0	13,000	TANK TRK	3600 GAL	2	22	5	H-P
7031085A	CLOVERDALE	CA	77/03/18	FUEL OIL	COMB L	0	0	8,000	TANK TRL	200 GAL	2	22	5	H-P
7030880A	ASHDOWN	AR	77/03/18	FUEL OIL	COMB L	0	0	54,000	TANK TRL	5500 GAL	22	0	5	H-P
7020775A	MERRILL	OR	77/01/20	FUEL OIL	COMB L	0	0	15	TANK TRL	50 GAL	22	0	5	H-P
8081426A	VENICE	FL	78/02/01	FUEL OIL	COMB L	0	0	20,100	TANK TRL	4200 GAL	22	0	5	H-P
8050387A	NORLINA	NC	78/04/24	FUEL OIL	COMB L	0	0	23,000	TANK TRL	6171 GAL	22	0	5	H-P
7100735A	LAWRENCEVILLE	IL	77/09/29	FUEL OIL	COMB L	0	0	5,000	TANK TRL	6000 GAL	22	0	5	H-P
8041364A	BUNKIE	LA	78/04/08	FUEL OIL	COMB L	0	0	250,000	MC306	7415 GAL	22	0	5	H-P
8081428A	W PALM BEACH	FL	78/02/27	FUEL OIL	COMB L	0	0	200	TANK TRL	500 GAL	22	0	5	H-P
8071343A	CASPER	WY	78/07/17	FUEL OIL	COMB L	0	0	2,000	MC306	4049 GAL	22	0	5	H-P
8081427A	FORT MEADE	FL	78/05/18	FUEL OIL	COMB L	0	0	600	TANK TRL	1000 GAL	22	0	5	H-P
7120178A	ANTONITO	CO	77/11/19	FUEL OIL	COMB L	0	0	27,500	TANK TRL	7500 GAL	22	0	5	H-P
7060601A	COLUMBIA	MO	77/06/01	FUEL OIL	COMB L	0	0	60,000	TANK TRK	150 GAL	22	0	5	H-P
8011070A	CURTIN	OR	78/01/02	FUEL OIL	COMB L	0	0	25,000	TANK TRL	848 GAL	22	0	5	H-P
7030103A	MINERAL POINT	WI	77/02/04	FUEL OIL 1 2 4 OR 5	COMB L	0	0	2,500	MC305	4400 GAL	2	22	5	H-H
7120103A	ABILENE	TX	77/11/19	FUEL OIL 1 2 4 OR 5	COMB L	0	0	2,275	TANK TRL	6500 GAL	22	0	5	H-H
7030021A	MACON	GA	77/02/19	FUEL OIL 1 2 4 OR 5	COMB L	0	0	2,000	MC306	1744 GAL	22	0	5	H-H
7030119A	WYTHEVILLE	VA	77/02/24	FUEL OIL 1 2 4 OR 5	COMB L	0	0	12,000	TANK TRL	5253 GAL	2	22	5	H-H
7030120A	LAUREL FORK	VA	77/02/25	FUEL OIL 1 2 4 OR 5	COMB L	0	0	15,000	TANK TRL	4420 GAL	2	22	5	H-H
6100356A	FREDERICK	MD	76/10/05	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,300	MC306	2700 GAL	2	22	5	H-H
7111127A	RIFLE	CO	77/11/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,448	MC305	2955 GAL	22	0	5	H-H
8010934A	VALONIA	IN	77/12/27	FUEL OIL 1 2 4 OR 5	COMB L	0	0	30,000	TANK TRK	6500 GAL	22	0	2	H-H
6100490A	HOPEWELL	NJ	76/10/07	FUEL OIL 1 2 4 OR 5	COMB L	0	0	5,000	MC306	5500 GAL	22	0	5	H-H
6080844A	MITCHELL	IL	76/07/21	FUEL OIL 1 2 4 OR 5	COMB L	0	0	5,000	MC306	2184 GAL	2	22	5	H-H
7020386A	LEWISTON	NY	77/01/18	FUEL OIL 1 2 4 OR 5	COMB L	0	0	80	MC306	175 GAL	2	22	5	H-H
8040105A	SUMMERVILLE	SC	78/02/02	FUEL OIL 1 2 4 OR 5	COMB L	0	0	12,900	MC306	6500 GAL	22	0	5	H-H
7060039A	BLOUNTSTOWN	FL	77/05/16	FUEL OIL 1 2 4 OR 5	COMB L	0	0	2,710	TANK TRL	4500 GAL	22	0	6	H-H
7020199A	WENDELL	WV	77/01/07	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	MC305	600 GAL	22	0	5	H-H
8031350A	TAMPA	FL	78/03/21	FUEL OIL 1 2 4 OR 5	COMB L	0	0	16,000	MC312	2634 GAL	22	0	5	H-H
8020917A	MOULTON	AL	78/02/10	FUEL OIL 1 2 4 OR 5	COMB L	0	0	6,000	TANK TRL	4000 GAL	22	0	5	H-H
8020329A	MOYOCK	NC	78/01/13	FUEL OIL 1 2 4 OR 5	COMB L	0	0	600	MC305	1200 GAL	2	22	5	H-H
7070688A	BAGDAD	AZ	77/06/28	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,500	MC305	3100 GAL	22	0	5	H-H
8020301A	STOKESDALE	NC	78/01/31	FUEL OIL 1 2 4 OR 5	COMB L	0	0	7,500	MC306	6000 GAL	2	22	5	H-H

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INCIDENTS INVOLVING VEHICULAR ACCIDENTS DURING JULY 1973 THRU DECEMBER 1978

EPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
6070503A	VALLEY FALLS	KS	76/07/08	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	MC306	2000 GAL	22	0	5	H-H
7010051A	CHIDESTER	AR	76/12/20	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	TANK TRL	5204 GAL	22	0	5	H-H
8030671A	LAKE GEORGE	CO	78/03/03	FUEL OIL 1 2 4 OR 5	COMB L	0	0	66,000	TANK TRL	9500 GAL	2	22	5	H-H
3030559A	MOULTON	AL	78/02/10	FUEL OIL 1 2 4 OR 5	COMB L	0	0	6,000	TANK TRL	4000 GAL	22	0	5	H-H
7121088A	GUM SPRINGS	VA	77/12/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	15,000	MC306	1900 GAL	22	0	5	H-H
3030592A	LA GRANGE	KY	78/03/07	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	TANK TRL	5500 GAL	2	22	5	H-H
7090870B	RAPID CITY	SD	77/08/31	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,500	MC306	1400 GAL	22	0	5	H-H
7080077A	LIBERAL	KS	77/07/19	FUEL OIL 1 2 4 OR 5	COMB L	0	0	400	MC304	1000 GAL	22	0	5	H-H
7080675A	BURLINGTON	CO	77/07/29	FUEL OIL 1 2 4 OR 5	COMB L	0	0	2,500	MC306	3900 GAL	2	22	5	H-H
7010627A	EVANSVILLE	IN	77/01/13	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,000	MC305	2000 GAL	22	0	5	H-H
7010611A	YAMPA	CO	77/01/08	FUEL OIL 1 2 4 OR 5	COMB L	0	0	6,000	MC306	2295 GAL	22	0	5	H-H
6120284A	SPENCER	NY	76/12/04	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,300	MC307	2600 GAL	22	0	5	H-H
8020969A	BERRYVILLE	VA	78/02/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	350	MC306	695 GAL	22	0	5	H-H
7121077A	CAIRO	GA	77/12/17	FUEL OIL 1 2 4 OR 5	COMB L	0	0	850	MC306	2500 GAL	2	22	5	H-H
7090080A	RIVERTON	WY	77/08/19	FUEL OIL 1 2 4 OR 5	COMB L	0	0	937	MC306	2660 GAL	22	0	5	H-H
7090870A	RAPID CITY	SD	77/08/31	FUEL OIL 1 2 4 OR 5	COMB L	0	0	5,000	MC306	5000 GAL	22	0	5	H-H
8010717A	ROCHESTER	NY	78/01/10	FUEL OIL 1 2 4 OR 5	COMB L	0	0	8,000	TANK TRL	1200 GAL	22	0	5	H-H
7090545A	KITTY HAWK	NC	77/09/22	FUEL OIL 1 2 4 OR 5	COMB L	0	0	576	MC305	1200 GAL	22	0	5	H-H
6120255A	WILSON	NC	76/11/17	FUEL OIL 1 2 4 OR 5	COMB L	0	0	2,500	TANK TRK	1900 GAL	22	0	5	H-H
8080340A	HIGHLAND CNTY	VA	78/07/14	FUEL OIL 1 2 4 OR 5	COMB L	0	0	5,000	MC306	7400 GAL	22	0	5	H-H
8080213A	LONG POND	PA	78/07/31	FUEL OIL 1 2 4 OR 5	COMB L	0	0	200	MC306	353 GAL	22	0	5	H-H
8091379A	NEW CREEK	WV	78/09/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,850	MC306	3700 GAL	22	0	5	H-H
8081347A	PARIS	OH	78/08/12	FUEL OIL 1 2 4 OR 5	COMB L	0	0	150	MC305	650 GAL	22	0	5	H-H
8061880A	WOLF POINT	MT	78/06/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,000	TANK TRL	1050 GAL	22	0	5	H-H
8071078A	PORTSMOUTH	NH	78/07/03	FUEL OIL 1 2 4 OR 5	COMB L	0	0	32,000	MC306	2500 GAL	22	0	5	H-H
8091103A	CASPER	WY	78/09/09	FUEL OIL 1 2 4 OR 5	COMB L	0	0	750	MC305	1500 GAL	2	22	5	H-H
8111434A	LONDON	KY	78/11/17	FUEL OIL 1 2 4 OR 5	COMB L	0	0	110	TANK TRL	200 GAL	22	0	5	H-H
8061157A	COMPASS LAKE	FL	78/06/09	FUEL OIL 1 2 4 OR 5	COMB L	0	0	535	MC306	1500 GAL	22	0	5	H-H
8120047A	DE BEQUE	CO	78/11/21	FUEL OIL 1 2 4 OR 5	COMB L	0	0	22,000	MC305	3696 GAL	2	22	5	H-H
8120454A	TUSCALOOSA	AL	78/11/17	FUEL OIL 1 2 4 OR 5	COMB L	0	0	25,000	MC306	8940 GAL	22	0	5	H-H
8090419A	NARA VISA	NM	78/08/30	FUEL OIL 1 2 4 OR 5	COMB L	0	0	3,472	MC305	8680 GAL	22	0	5	H-H
8120455A	FAIRFIELD	AL	78/11/17	FUEL OIL 1 2 4 OR 5	COMB L	0	0	20,000	MC306	8925 GAL	2	0	5	H-H
8120942A	HIBBING	MN	78/12/11	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,000	MC305	1800 GAL	22	0	5	H-H
8110361A	FT WASHINGTON	PA	78/10/21	FUEL OIL 1 2 4 OR 5	COMB L	0	0	4,000	MC306	3665 GAL	22	0	5	H-H
8120937A	FT LAUDERDALE	FL	78/12/16	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,740	MC306	1741 GAL	22	0	5	H-H
8081614A	HUTCHINSON	KS	78/07/08	FUEL OIL 1 2 4 OR 5	COMB L	0	0	450	MC306	938 GAL	22	0	5	H-H
8100858A	PINE GROVE	CA	78/10/03	FUEL OIL 1 2 4 OR 5	COMB L	0	0	80,000	MC306	7700 GAL	22	0	6	H-H
8120701A	GRAND RAPIDS	MI	78/12/12	FUEL OIL 1 2 4 OR 5	COMB L	0	0	2,500	MC306	3000 GAL	2	22	5	H-H
7020788A	SCOTTDALE	MI	77/02/07	FUEL OIL 1 2 4 OR 5	COMB L	0	0	10,000	TANK TRL	2939 GAL	22	0	5	H-P
6070400A	BLANTON	MS	76/06/22	FUEL OIL 1 2 4 OR 5	COMB L	0	0	250	TANK TRK	100 GAL	2	22	5	H-P
7030280A	KENOVA	WV	77/02/18	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	MC306	450 GAL	2	22	5	H-P
7020066A	COLUMBUS	OH	77/01/19	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	TANK TRL	740 GAL	22	0	5	H-P
7030436A	YORK SPRINGS	PA	77/02/24	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1	TANK TRK	6 QTS	22	0	5	H-P
6120008A	KANSAS CITY	MO	76/11/22	FUEL OIL 1 2 4 OR 5	COMB L	0	0	5,000	MC305	6000 GAL	22	0	5	H-P
6100488A	PADUCAH	KY	76/10/04	FUEL OIL 1 2 4 OR 5	COMB L	0	0	105	MC306	200 GAL	2	22	5	H-P
6071002A	WILBRAHAM	MA	76/07/19	FUEL OIL 1 2 4 OR 5	COMB L	0	0	5,500	MC306	711 GAL	22	0	5	H-P
7040198A	PITTSTON	PA	77/04/04	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	MC306	1000 GAL	22	0	5	H-P
7020462A	ROCKPORT	CA	75/05/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	TANK TRL	1095 GAL	2	22	5	H-P
7030858A	WILKESBORO	NC	77/02/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	700	TANK TRK	2000 GAL	22	0	5	H-P
7040135A	WALDORF	MD	77/03/24	FUEL OIL 1 2 4 OR 5	COMB L	0	0	10,000	TANK TRK	734 GAL	22	0	5	H-P

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INCIDENTS INVOLVING VEHICULAR ACCIDENTS DURING JULY 1973 THRU DECEMBER 1978

REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
7040459A	COVINGTON	KY	77/04/07	FUEL OIL 1 2 4 OR 5	COMB L	0	0	450	MC306	750 GAL	22	0	5	H-P
8020482A	BALDWINSVILLE	NY	78/02/08	FUEL OIL 1 2 4 OR 5	COMB L	0	0	550	MC306	241 GAL	22	0	5	H-P
8060030A	REDFIELD	NY	78/05/23	FUEL OIL 1 2 4 OR 5	COMB L	0	0	30	MC306	60 GAL	22	0	5	H-P
7080603A	HUGHESVILLE	PA	77/07/28	FUEL OIL 1 2 4 OR 5	COMB L	0	0	3,000	MC306	400 GAL	22	0	5	H-P
8020175A	PHILADELPHIA	PA	77/12/21	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	MC306	294 GAL	22	0	5	H-P
8120214A	PHOENIX	AZ	78/11/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,085	MC306	3500 GAL	2	22	5	H-P
8011091A	CASPER	WY	78/01/16	FUEL OIL 1 2 4 OR 5	COMB L	0	0	33,800	MC306	3000 GAL	22	0	5	H-P
7080998A	SHIPPINGPORT	PA	77/08/04	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,460	MC305	4000 GAL	22	0	5	H-P
8071517A	GLENFIELD	NY	78/07/07	FUEL OIL 1 2 4 OR 5	COMB L	0	0	100	MC306	245 GAL	22	0	5	H-P
7050093A	PHILADELPHIA	PA	77/02/26	FUEL OIL 1 2 4 OR 5	COMB L	0	0	20,002	TANK TRK	150 GAL	2	22	5	H-P
8010087A	ATHENS	WI	77/12/25	FUEL OIL 1 2 4 OR 5	COMB L	0	0	19	TANK TRK	50 GAL	22	0	5	H-P
8020625A	MABTON	WA	78/01/26	FUEL OIL 1 2 4 OR 5	COMB L	0	0	35,000	TANK TRL	4294 GAL	22	0	5	H-P
7050293A	REDMOND	WA	77/04/25	FUEL OIL 1 2 4 OR 5	COMB L	0	0	4,000	TANK TRL	1600 GAL	22	0	5	H-P
7081273A	CITY UNKNOWN	MN	77/08/16	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	MC306	91 GAL	22	0	5	H-P
8061468A	CAMPBELLSBURG	KY	78/05/31	FUEL OIL 1 2 4 OR 5	COMB L	0	0	20,000	TANK TRL	500 GAL	22	0	5	H-P
8030081A	WYE MILLS	MD	78/02/16	FUEL OIL 1 2 4 OR 5	COMB L	0	0	3,000	MC306	422 GAL	22	0	5	H-P
8101099A	PANSY	PA	78/10/10	FUEL OIL 1 2 4 OR 5	COMB L	0	0	350	MC330	800 GAL	22	0	5	H-P
8031252A	FLEMINGTON	NJ	78/03/16	FUEL OIL 1 2 4 OR 5	COMB L	0	0	536	MC306	72 GAL	22	0	5	H-P
7080719A	MORELAND HLS	OH	77/07/27	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	MC306	1371 GAL	22	0	5	H-P
7110769A	SKOWHEGAN	ME	77/11/14	FUEL OIL 1 2 4 OR 5	COMB L	0	0	225	MC306	33 GAL	11	22	5	H-P
7041029A	SOMERSET	KY	77/04/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	39,090	TANK TRL	5337 GAL	2	22	5	H-P
8041500A	NORFOLK	VA	78/04/18	FUEL OIL 1 2 4 OR 5	COMB L	0	0	600	MC306	100 GAL	2	22	6	H-P
7070350A	JASPER	AL	77/06/28	FUEL OIL 1 2 4 OR 5	COMB L	0	0	0	TANK TRL	4000 GAL	22	0	5	H-P
8050532A	DISTRICT	PA	78/05/02	FUEL OIL 1 2 4 OR 5	COMB L	0	0	500	MC306	750 GAL	22	0	5	H-P
7091434A	BOLIVAR	OH	77/09/15	FUEL OIL 1 2 4 OR 5	COMB L	0	0	8,000	TANK TRL	3900 GAL	22	0	5	H-P
7090861A	PAGE	AZ	77/09/12	FUEL OIL 1 2 4 OR 5	COMB L	0	0	1,800	TANK TRL	5300 GAL	22	0	5	H-P
7070334A	CHARLOTTE	NC	77/06/25	FUEL OIL 1 2 4 OR 5	COMB L	0	0	35,000	TANK TRL	7500 GAL	22	0	5	H-P
7030298A	SUNBURY	NC	77/03/02	KEROSENE	COMB L	0	0	5,000	TANK TRL	5270 GAL	22	0	5	H-H
7020364A	ROCKY MOUNT	NC	77/02/01	KEROSENE	COMB L	0	0	1,796	TANK TRL	4500 GAL	22	0	5	H-H
8100959A	BRISTOL	TN	78/10/05	KEROSENE	COMB L	0	0	35,000	MC306	6852 GAL	22	0	5	H-H
8070514A	PLANT CITY	FL	78/02/06	KEROSENE	COMB L	0	0	1,503	MC306	4335 GAL	22	0	5	H-H
6110236A	ST STEPHENS	SC	76/10/25	KEROSENE	COMB L	0	0	150,000	TANK TRL	9000 GAL	22	0	6	H-P
8020482B	BALDWINSVILLE	NY	78/02/08	KEROSENE	COMB L	0	0	550	MC306	241 GAL	22	0	5	H-P
7120179A	IGNACIO	CO	77/11/30	KEROSENE	COMB L	0	0	6,500	TANK TRL	1500 GAL	2	22	5	H-P
8010846A	CARIBOU	ME	78/01/18	KEROSENE	COMB L	0	0	400	MC306	75 GAL	2	22	5	H-P
8011090A	ENID	OK	78/01/12	KEROSENE	COMB L	0	0	1,000	TANK TRL	200 GAL	22	0	5	H-P
6110823A	FINDLAY	OH	76/11/11	METHYL AMYL KETONE	COMB L	0	0	32,000	MC305	5100 GAL	22	0	5	H-H
6070458A	BORGER	TX	76/06/28	OIL NOS PETROL CL	COMB L	0	0	738	TANK TRL	6148 GAL	22	0	5	H-H
8011159A	S PASS	WY	77/12/14	OIL NOS PETROL CL	COMB L	0	0	1,500	MC306	3063 GAL	22	0	5	H-H
7080952A	SNYDER	OK	77/08/06	OIL NOS PETROL CL	COMB L	0	0	8,892	TANK TRK	2964 GAL	22	0	5	H-H
7100709A	MATANUSKA	AK	77/09/19	OIL NOS PETROL CL	COMB L	0	0	16,100	MC306	1448 GAL	22	0	5	H-P
7120913A	TOLDEO	OH	77/12/10	PETROLEUM DISTIL CL	COMB L	0	0	6,000	TANK TRL	2115 GAL	22	0	5	H-H
7061435A	TILLAMOOK	OR	77/06/21	PETROLEUM DISTIL CL	COMB L	0	0	6,800	TANK TRL	377 GAL	22	0	5	H-P
7030884A	SEWAREN	NJ	77/03/03	PETROLEUM NAPTHA CL	COMB L	0	0	100	MC306	0 GAL	22	0	5	H-P
7090413A	CUMBERLAND	MD	77/08/11	SOLVENT NOS CL	COMB L	0	0	0	MC303	1930 GAL	22	0	5	H-H
8060275B	MICHIGAN CITY	IN	78/05/22	SOLVENT NOS CL	COMB L	0	0	6,500	TANK TRL	25 GAL	22	0	5	H-P
4020254A	SUTTON	NH	74/01/22	ACETONE	F. L.	0	0	0	DRUM MTL	0	2	7	4	H-H
5080513A	TRACY	CA	75/08/08	ACETONE	F. L.	0	0	3,500	MC302	0	17	0	5	H-H
4120163A	HOUSTON	TX	74/11/06	ACETONE	F. L.	0	0	4,700	MC303	0	2	17	5	H-H
4070584A	MAULDIN	SC	74/07/08	ACETONE	F. L.	0	0	3,000	MC305	0	17	0	5	H-H

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REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
3070344A	EMPORIA	KS	73/06/11	ACETONE	F. L.	0	0	500	TANK TRL	0	17	0	5	H-H
7050052A	VERSAILLES	MO	77/04/13	ACETONE	F. L.	0	0	900	MC306	678 GAL	22	0	5	H-H
6090969A	ASHBURN	GA	76/09/19	ACETONE	F. L.	0	0	25,000	MC306	5902 GAL	22	0	4	H-H
8070151A	ANNAPOLIS	MD	78/05/16	ACETONE	F. L.	0	0	500	MC306	225 GAL	22	0	5	H-H
8090037A	GREENVILLE	AL	78/08/11	ACETONE	F. L.	0	0	10,000	MC306	3400 GAL	22	0	5	H-H
7010186A	MODALE	IA	76/12/27	ACETONE	F. L.	0	0	0	TANK TRK	630 GAL	22	0	6	H-P
8111320A	CAMERON	WI	78/11/15	ACETONE	F. L.	0	0	1,000	57	500 GAL	22	0	6	H-P
8060275A	MICHIGAN CITY	IN	78/05/22	ACETONE	F. L.	0	0	6,000	TANK TRL	25 GAL	22	0	5	H-P
3100385A	LIVINGSTON	AL	73/10/04	ACRYLONITRILE	F. L.	0	0	1,000	MC304	0	17	0	5	H-H
8031316A	N LITTLE ROCK	AR	78/02/28	ACRYLONITRILE	F. L.	0	0	10	MC305	1 GAL	22	0	5	H-H
5100916A	BUCHANNON	VA	75/10/10	ALCOHOL, N.O.S.	F. L.	0	0	21,100	MC307	0	17	0	5	H-H
4080879A	LOUISVILLE	KY	74/08/17	ALCOHOL, N.O.S.	F. L.	0	0	0	17E	0	17	0	5	H-H
4070828A	BARTONSVILLE	PA	74/07/25	ALCOHOL, N.O.S.	F. L.	0	0	1,500	MC305	0	2	0	5	H-H
3070240A	ATLANTA	GA	73/06/23	ALCOHOL, N.O.S.	F. L.	0	0	100	CAN MTL	0	17	0	5	H-H
6030207A	JACKSON	MS	76/02/12	ALCOHOL, N.O.S.	F. L.	0	0	5,000	CAN MTL	3456 LBS	22	0	6	H-H
5020366A	LITTLE ROCK	AR	75/01/28	ALCOHOL, N.O.S.	F. L.	0	0	1,200	MC307	0	17	0	5	H-H
8020563A	DINUBA	CA	77/11/28	ALCOHOL N.O.S.	F. L.	0	0	1,500	TANK TRL	3500 GAL	0	0	5	H-H
8011103A	BRIDGMAN	MI	78/01/11	ALCOHOL N.O.S.	F. L.	0	0	60,000	MC306	3700 GAL	2	22	5	H-H
8020562A	ESCALON	CA	77/07/18	ALCOHOL N.O.S.	F. L.	0	0	750	TANK TRL	1433 GAL	2	22	5	H-H
7111118A	BALTIMORE	MD	77/11/18	ALCOHOL N.O.S.	F. L.	0	0	350	DRUM MTL	110 GAL	20	22	5	H-H
8020751A	HENRIETTA	NY	78/01/30	ALCOHOL N.O.S.	F. L.	0	0	4,000	MC306	9650 LBS	22	0	5	H-H
8050598A	MOUNT OLIVE	MS	78/05/03	ALCOHOL N.O.S.	F. L.	0	0	350	MC307	200 GAL	22	0	5	H-H
7070737B	ATLANTA	GA	77/06/29	ALCOHOL N.O.S.	F. L.	0	0	0	BOTL PLS	42 GAL	22	0	5	H-H
7020916A	NEW CASTLE	IN	77/02/15	ALCOHOL N.O.S.	F. L.	0	0	0	MC306	17 GAL	22	0	5	H-H
8111480A	ANN ARBOR	MI	78/10/30	ALCOHOL N.O.S.	F. L.	0	0	17,000	MC307	10 GAL	22	0	5	H-H
8100174A	CARTHAGE	TX	78/09/23	ALCOHOL N.O.S.	F. L.	0	0	10	MC307	20 GAL	22	0	5	H-H
8111209A	JUNIATA	PA	78/09/27	ALCOHOL N.O.S.	F. L.	0	0	100	MC307	10 GAL	22	0	5	H-H
7010186D	MODALE	IA	76/12/27	ALCOHOL N.O.S.	F. L.	0	0	0	17E	55 GAL	22	0	6	H-P
3120106A	CHICAGO	IL	73/11/16	AMYL ACETATES	F. L.	0	0	0	DRUM MTL	0	17	0	5	H-H
7081033A	MARSHALL	AR	77/08/03	ASPHALT CUT BACK F	F. L.	1	1	5,000	TANK TRL	8500 GAL	22	0	5	H-H
6080586A	SALT LAKE CY	UT	76/08/06	ASPHALT CUT BACK F	F. L.	0	0	100	MC306	100 GAL	22	0	5	H-H
7090862A	BINGER	OK	77/08/25	ASPHALT CUT BACK F	F. L.	0	0	1,460	TANK TRK	6600 GAL	22	0	5	H-H
8080979A	ARKADELPHIA	AR	78/08/08	ASPHALT CUT BACK F	F. L.	0	0	10,000	TANK TRL	6300 GAL	22	0	5	H-H
8091386A	FAYETTE CNTY	WV	78/09/13	ASPHALT CUT BACK F	F. L.	0	0	250,000	TANK TRL	6200 GAL	22	0	5	H-H
5030134A	GADSDEN	AL	75/02/12	BENZENE (BENZOL)	F. L.	0	0	900	MC307	0	17	0	5	H-H
7081464A	HOLDEN	UT	77/08/17	BENZENE (BENZOL)	F. L.	0	0	30,000	MC311	1550 GAL	22	0	5	H-H
7030640A	MCKEES ROCKS	PA	77/02/11	BENZENE (BENZOL)	F. L.	0	0	5,000	MC302	3400 GAL	2	22	5	H-H
8030820A	MOULTON	AL	78/03/11	BENZENE (BENZOL)	F. L.	0	0	0	MC301	1 GAL	22	0	5	H-H
6010567A	NEW CANTON	TN	76/01/14	BUTYL ACETATE	F. L.	0	0	42,000	MC304	2000 GAL	22	0	6	H-H
4060478A	BEAUMONT	KS	74/05/09	CEMENT LIQUID N.O.S	F. L.	0	0	573	CAN MTL	0	17	0	5	H-H
4100390B	LAGRANGE	GA	74/10/04	CEMENT LIQUID N.O.S	F. L.	0	0	0	CAN MTL	0	3	17	5	H-H
5080233A	PATERSON	NJ	75/07/31	CEMENT LIQUID N.O.S	F. L.	0	0	0	PAIL MTL	0	17	0	5	H-H
6010162A	HAINESBURG	NJ	75/12/16	CEMENT LIQUID N.O.S	F. L.	0	0	400	17H	55 GAL	22	0	5	H-H
5020429A	KANSAS CITY	MO	75/01/15	CEMENT LIQUID N.O.S	F. L.	0	0	400	BLANK	0	7	17	6	H-H
6090637A	PLANO	TX	76/08/18	CEMENT LIQUID N.O.S	F. L.	0	0	25	PAIL MTL	1 OZS	22	0	5	H-H
8050232A	GREENFIELD	IN	78/04/22	CEMENT LIQ NOS	F. L.	0	0	492	DRUM MTL	165 GAL	22	0	5	H-H
6080101A	RACINE	WI	76/07/23	CEMENT LIQUID N.O.S	F. L.	0	0	0	CAN MTL	0	22	0	5	H-H
•8101097A	ROCKMART	GA	78/09/20	CEMENT LIQ NOS	F. L.	0	0	1,000	DRUM MTL	100 GAL	22	0	5	H-H
•8081551B	CLARKESVILLE	TX	78/08/19	CEMENT LIQ NOS	F. L.	0	0	4,270	37A	290 GAL	22	0	5	H-H
•8081551A	CLARKESVILLE	TX	78/08/19	CEMENT LIQ NOS	F. L.	0	0	4,000	17H	155 GAL	22	0	5	H-H

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●8101279A	ROCKMART	GA	78/09/20	CEMENT LIQ NOS	F. L.	0	0	1,000	DRUM MTL	100 GAL	22	0	5	H-H
7050513A	BREEZEWOOD	PA	77/04/28	CEMENT LIQ NOS	F. L.	0	0	40,000	17E	500 GAL	2	22	5	H-P
5070575A	OSCEOLA	IN	75/06/24	CEMENT ROOFING LIQ	F. L.	0	0	450	PAIL MTL	0	2	17	5	H-H
7040247B	LEWISTOWN	PA	77/03/31	COAL TAR DISTILLATE	F. L.	0	0	550	DRUM MTL	55 GAL	7	22	2	H-H
8081027A	FRYSTOWN	PA	78/08/15	COAL TAR LIGHT OIL	F. L.	0	0	16,500	MC306	6406 GAL	22	0	6	H-H
5020432A	KANSAS CITY	MO	75/01/15	COLLODION	F. L.	0	0	24	BLANK	0	7	17	6	H-H
3080312A	SUN CITY	FL	73/07/14	COMP CLEANING LIQ F	F. L.	0	0	13,000	MC305	0	2	0	5	H-H
5010172A	RAWLINS	WY	74/12/21	COMP PAINT REMOVE F	F. L.	0	0	5,500	DRUM MTL	0	17	0	5	H-H
4100389A	LAGRANGE	GA	74/10/04	COMP PAINT REMOVE F	F. L.	0	0	35	DRUM MTL	0	3	17	5	H-H
5020146A	BATAVIA	NY	75/01/30	COMP PAINT REMOVE F	F. L.	0	0	1,550	5B	0	17	0	5	H-H
4120036A	AMERICUS	GA	74/05/23	COMP PAINT REMOVE F	F. L.	0	0	17,000	37B	0	2	0	5	H-H
●4120630A	RAWLINS	WY	74/12/21	COMP PAINT REMOVE F	F. L.	0	0	0	DRUM MTL	0	17	0	5	H-H
6020511A	NEW ORLEANS	LA	76/02/02	COMP PAINT REMOVE F	F. L.	0	0	0	CAN MTL	128 GAL	22	0	5	H-H
●4120630B	RAWLINS	WY	74/12/21	COMP PAINT REMOVE F	F. L.	0	0	0	CAN	0	17	0	5	H-H
●5010172B	RAWLINS	WY	74/12/21	COMP PAINT REMOVE F	F. L.	0	0	0	DRUM MTL	0	17	0	5	H-H
8020199A	METTLER	CA	78/01/28	COMP PAINT REMOVE F	F. L.	0	0	50	DRUM MTL	30 GAL	2	22	5	H-H
8011179A	BUTTE	MT	77/09/28	COMP PAINT REMOVE F	F. L.	0	0	10,000	MC306	2250 GAL	22	0	5	H-H
7020389A	CHARLOTTE	NC	77/01/21	COMP PAINT REMOVE F	F. L.	0	0	0	DRUM MTL	1 GAL	9	0	5	H-H
●7030251A	WASHINGTON CH	OH	77/02/21	COMP PAINT REMOVE F	F. L.	0	0	49	17E	20 GAL	2	22	5	H-H
●7030251B	WASHINGTON CH	OH	77/02/21	COMP PAINT REMOVE F	F. L.	0	0	36	5B	15 GAL	2	22	5	H-H
8041045A	BARSTOW	CA	78/04/09	COMP PAINT REMOVE F	F. L.	0	0	5	CAN MTL	1 GAL	22	0	5	H-H
7081572A	CASTIC	CA	77/07/30	COMP PAINT REMOVE F	F. L.	0	0	0	TANK TRK	4000 GAL	22	0	6	H-H
8060897A	DICKSON	TN	78/06/01	COMP PAINT REMOVE F	F. L.	0	0	1,000	MC307	500 GAL	22	0	5	H-H
8101377A	METAIRIE	LA	78/10/19	COMP PAINT REMOVE F	F. L.	0	0	1,500	MC306	50 GAL	22	0	5	H-H
5100365A	GALESBURG	IL	75/09/25	COMP PAINT REMOVE F	F. L.	0	0	20,000	MC306	0	2	17	5	H-P
4110163A	ABILENE	TX	74/10/23	COMP PAINT REMOVE F	F. L.	0	0	75,000	37A	0	17	0	5	H-P
6120798B	FLORENCE	TX	76/12/10	COMP PAINT REMOVE F	F. L.	0	0	0	37B	25 GAL	22	0	5	H-P
4110762A	BAY MINETTE	AL	74/11/13	COMP PAINT REMOVE F	F. L.	0	0	13,292	TANK TRL	0	17	0	5	H-P
7010186E	MODALE	IA	76/12/27	COMP PAINT REMOVE F	F. L.	0	0	0	17E	55 GAL	22	0	6	H-P
7051101A	EDGEWOOD	MD	77/05/12	COMP PAINT REMOVE F	F. L.	0	0	1,000	MC306	2000 GAL	22	0	5	H-P
7070951A	ADA	OK	77/05/06	COMP PAINT REMOVE F	F. L.	0	0	60	DRUM MTL	5 GAL	2	22	5	H-P
5040527A	MUSCATINE	IA	75/04/17	COMP TR-WD KILL FL	F. L.	0	0	8,000	37B	0	2	17	5	H-H
6050673A	MIDDLEBURY	OH	76/03/10	COMP TR-WD KILL FL	F. L.	0	0	10	37B	2 QTS	22	0	5	H-H
8050126A	DECATUR	AL	78/04/10	COMP TR-WD KILL FL	F. L.	0	0	3,200	37B	50 LBS	22	0	5	H-P
8051272A	COLQUITT	GA	78/05/02	COMP TR-WD KILL FL	F. L.	0	0	3,486	37B	7 GAL	22	0	5	H-P
5040261A	THOMAS	OK	75/03/24	CRUDE OIL PETROLEUM	F. L.	0	0	18,700	MC304	0	17	0	5	H-H
5010711A	ALTAMONT	UT	75/01/20	CRUDE OIL PETROLEUM	F. L.	0	0	250	MC302	0	2	0	5	H-H
5010729A	CRAIG	CO	75/01/06	CRUDE OIL PETROLEUM	F. L.	0	0	11,000	MC302	0	2	17	5	H-H
4120358A	DUCHESNE	UT	74/11/28	CRUDE OIL PETROLEUM	F. L.	0	0	20,000	MC302	0	17	0	6	H-H
5040276A	HIAWATHA CAMP	CO	75/04/02	CRUDE OIL PETROLEUM	F. L.	0	0	2,400	TANK TRL	0	17	0	5	H-H
5020036A	ALTAMONT	UT	75/01/22	CRUDE OIL PETROLEUM	F. L.	0	0	5,000	MC306	0	2	0	5	H-H
3090306A	PROVOCANYON	UT	73/09/11	CRUDE OIL PETROLEUM	F. L.	0	0	10,000	MC305	0	2	0	5	H-H
5090909A	FARSON	WY	75/09/12	CRUDE OIL PETROLEUM	F. L.	0	0	20,784	TANK TRK	0	17	0	5	H-H
5020535A	LANDER	WY	75/02/12	CRUDE OIL PETROLEUM	F. L.	0	0	28,000	MC306	0	11	0	5	H-H
4110330A	ALTAMONT	UT	74/11/02	CRUDE OIL PETROLEUM	F. L.	0	0	15,000	MC302	0	2	0	5	H-H
4110002A	BAKERSFIELD	CA	74/10/17	CRUDE OIL PETROLEUM	F. L.	0	0	2,329	MC305	0	2	0	6	H-H
5030638A	ALTAMONT	UT	75/03/11	CRUDE OIL PETROLEUM	F. L.	0	0	5,000	MC305	0	2	17	5	H-H
5020135A	ALTAMONT	UT	75/01/25	CRUDE OIL PETROLEUM	F. L.	0	0	8,000	MC302	0	2	0	5	H-H
●4100370B	HEBER CITY	UT	74/09/28	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC302	0	2	0	5	H-H
●4100370A	HEBER CITY	UT	74/09/28	CRUDE OIL PETROLEUM	F. L.	0	0	25,000	MC302	0	2	0	5	H-H

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6030905A	NEOLA	UT	76/03/11	CRUDE OIL PETROLEUM	F. L.	0	0	2,500	MC306	6090 GAL	22	0	5	H-H
3120281A	SANDY	UT	73/11/26	CRUDE OIL PETROLEUM	F. L.	0	0	20,000	TANK TRK	0	17	0	5	H-H
4090358A	ALTONA	UT	74/08/24	CRUDE OIL PETROLEUM	F. L.	0	0	240	MC302	0	2	17	5	H-H
4010010A	SALT LAKE CY	UT	73/12/20	CRUDE OIL PETROLEUM	F. L.	0	0	20,000	MC305	0	17	0	5	H-H
5090909B	FARSON	WY	75/09/12	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC302	0	17	0	5	H-H
5020136A	DUCHESNE	UT	75/01/28	CRUDE OIL PETROLEUM	F. L.	0	0	12,000	MC306	0	17	0	1	H-H
5100349A	BAKERSFIELD	CA	75/09/19	CRUDE OIL PETROLEUM	F. L.	0	0	8,000	MC306	0	2	0	5	H-H
5050228A	ALTAMONT	UT	75/05/05	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC306	0	2	17	5	H-H
3080493A	HEBER CITY	UT	73/08/16	CRUDE OIL PETROLEUM	F. L.	0	0	4,000	MC306	0	2	0	5	H-H
6050514A	LAVILLA	TX	76/04/28	CRUDE OIL PETROLEUM	F. L.	0	0	1,200	TANK TRL	4200 GAL	22	0	5	H-H
5030673A	ALTAMONT	UT	75/02/10	CRUDE OIL PETROLEUM	F. L.	0	0	1,500	MC306	0	11	17	5	H-H
4060569A	ELSINORE	UT	74/06/09	CRUDE OIL PETROLEUM	F. L.	0	0	18,000	MC305	0	17	0	5	H-H
5020547A	BENKELMAN	NE	75/02/17	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC305	0	17	0	5	H-H
5030637A	ALTAMONT	UT	75/02/14	CRUDE OIL PETROLEUM	F. L.	0	0	2,500	MC305	0	17	0	5	H-H
4060214A	ROOSEVELT	UT	74/05/21	CRUDE OIL PETROLEUM	F. L.	0	0	200	MC306	0	17	0	5	H-H
5060238A	ALTAMOUNT	UT	75/05/27	CRUDE OIL PETROLEUM	F. L.	0	0	540	MC306	0	17	0	5	H-H
5060571A	TALMAGE	UT	75/06/06	CRUDE OIL PETROLEUM	F. L.	0	0	1,500	MC305	0	17	0	5	H-H
4040547A	SUNSET	AZ	74/04/22	CRUDE OIL PETROLEUM	F. L.	0	0	20,000	MC305	0	17	0	5	H-H
4040537A	SUPERIOR	AZ	74/04/16	CRUDE OIL PETROLEUM	F. L.	0	0	25,000	MC305	0	17	0	5	H-H
4040331A	ALTONAH	UT	74/04/04	CRUDE OIL PETROLEUM	F. L.	0	0	464	MC306	0	2	17	5	H-H
4040146A	ARKANSAS CY	KS	74/03/26	CRUDE OIL PETROLEUM	F. L.	0	0	525	TANK TRL	0	17	0	5	H-H
4040115A	MIDWEST	WY	74/03/18	CRUDE OIL PETROLEUM	F. L.	0	0	17,850	MC305	0	17	0	5	H-H
4040082A	ALTAMONT	UT	74/03/14	CRUDE OIL PETROLEUM	F. L.	0	0	150	MC306	0	17	0	5	H-H
5070167A	HELENA	OK	75/06/15	CRUDE OIL PETROLEUM	F. L.	0	0	12,292	MC304	0	17	0	5	H-H
4020092A	CANNONVILLE	UT	74/01/25	CRUDE OIL PETROLEUM	F. L.	0	0	20,000	MC305	0	17	0	5	H-H
8030830A	WENDOVER	NV	78/03/09	CRUDE OIL PETROLEUM	F. L.	0	0	25,000	MC306	3000 GAL	22	0	5	H-H
7010258A	PIOCHE	NV	76/12/15	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC306	9500 GAL	22	0	5	H-H
•6120302A	WOLF POINT	MT	76/11/27	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC305	4200 GAL	22	0	5	H-H
7090726A	BLUEBELL	UT	77/09/02	CRUDE OIL PETROLEUM	F. L.	0	0	3,000	MC306	8400 GAL	22	0	5	H-H
•6120302B	WOLF POINT	MT	76/11/27	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC305	5000 GAL	22	0	5	H-H
7071602A	FARSON	WY	77/07/20	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC306	1911 GAL	22	0	5	H-H
6120155A	LANDER	WY	76/11/23	CRUDE OIL PETROLEUM	F. L.	0	0	1,500	MC305	1890 GAL	22	0	5	H-H
•7091195A	DUCHESNE	UT	77/09/11	CRUDE OIL PETROLEUM	F. L.	0	0	240	MC306	840 GAL	2	22	5	H-H
6100136A	PORTLAND	KY	76/09/20	CRUDE OIL PETROLEUM	F. L.	0	0	200	MC304	200 GAL	2	22	5	H-H
7091195B	DUCHESNE	UT	77/09/11	CRUDE OIL PETROLEUM	F. L.	0	0	240	MC306	840 GAL	2	22	5	H-H
6060525A	SALT LAKE CY	UT	76/05/23	CRUDE OIL PETROLEUM	F. L.	0	0	210	MC305	300 GAL	22	0	5	H-H
7071602B	FARSON	WY	77/07/20	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC305	1911 GAL	22	0	5	H-H
7020271A	FARSON	WY	77/01/23	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC306	4400 GAL	2	22	5	H-H
7060687A	FARSON	WY	77/06/08	CRUDE OIL PETROLEUM	F. L.	0	0	25,000	MC305	4800 GAL	22	0	5	H-H
8031092A	MORTON	WY	78/03/11	CRUDE OIL PETROLEUM	F. L.	0	0	25,000	MC305	3780 GAL	22	0	5	H-H
8100228A	WENDOVER	NV	78/09/18	CRUDE OIL PETROLEUM	F. L.	0	0	32,000	MC305	6700 GAL	22	0	5	H-H
8091351A	FELLOWS	CA	78/08/30	CRUDE OIL PETROLEUM	F. L.	0	0	6,000	TANK TRL	5014 GAL	22	0	5	H-H
8090087A	HOUSTON	TX	78/08/14	CRUDE OIL PETROLEUM	F. L.	0	0	225	TANK TRL	210 GAL	22	0	5	H-H
8071607A	MC KITTRICK	CA	78/07/04	CRUDE OIL PETROLEUM	F. L.	0	0	3,500	MC305	7980 GAL	22	0	5	H-H
6120390A	ALEXANDER	ND	76/11/30	CRUDE OIL PETROLEUM	F. L.	0	0	200	MC306	336 GAL	22	0	5	H-P
5010710A	RECLUSE	WY	75/01/23	CRUDE OIL PETROLEUM	F. L.	0	0	2,140	TANK TRL	0	2	17	5	H-P
6110104A	SATANTA	KS	76/10/04	CRUDE OIL PETROLEUM	F. L.	0	0	25	TANK TRL	10 GAL	22	0	5	H-P
7031000A	SANTA MARLA	CA	77/03/15	CRUDE OIL PETROLEUM	F. L.	0	0	56	TANK TRL	6930 GAL	22	0	5	H-P
7010544A	ROZET	WY	77/01/11	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC306	1260 GAL	22	0	5	H-P
7010612A	SANDOVAL	NM	77/01/06	CRUDE OIL PETROLEUM	F. L.	0	0	5,100	MC306	5200 GAL	22	0	5	H-P

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REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
5120354A	BILL	WY	75/12/03	CRUDE OIL PETROLEUM	F. L.	0	0	9,000	MC306	0	2	17	5	H-P
6100432A	ROZET	WY	76/10/08	CRUDE OIL PETROLEUM	F. L.	0	0	14,175	MC306	840 GAL	2	22	5	H-P
4090561A	GARY	CA	74/09/13	CRUDE OIL PETROLEUM	F. L.	0	0	5,000	DRUM MTL	0	17	0	6	H-P
6120473A	SAGE SPG CRK	WY	76/12/04	CRUDE OIL PETROLEUM	F. L.	0	0	3,300	TANK TRL	50 GAL	22	0	5	H-P
7030279A	LEATHERWOOD	KY	77/02/12	CRUDE OIL PETROLEUM	F. L.	0	0	25,200	MC306	1890 GAL	2	22	5	H-P
5030385A	PEARSALL	TX	75/02/28	CRUDE OIL PETROLEUM	F. L.	0	0	18,300	MC306	0	17	0	5	H-P
6091059A	YOUNGSVILLE	PA	76/09/13	CRUDE OIL PETROLEUM	F. L.	0	0	1,000	MC306	4000 GAL	2	22	5	H-P
6040427A	GLENROCK	WY	76/04/07	CRUDE OIL PETROLEUM	F. L.	0	0	8,500	MC306	336 GAL	2	22	5	H-P
7020521A	WATFORD CITY	ND	77/02/04	CRUDE OIL PETROLEUM	F. L.	0	0	1,120	MC306	1300 GAL	2	22	5	H-P
6060033A	GRASSY BUTTES	ND	76/05/25	CRUDE OIL PETROLEUM	F. L.	0	0	500	MC306	126 GAL	22	0	5	H-P
7010254A	WATFORD CITY	ND	76/12/26	CRUDE OIL PETROLEUM	F. L.	0	0	0	MC306	126 GAL	2	17	5	H-P
7010088A	MARLAND	OK	76/12/15	CRUDE OIL PETROLEUM	F. L.	3	0	552,000	MC307	9600 GAL	22	0	6	H-P
8030032A	DUCHESNE	UT	78/02/15	CRUDE OIL PETROLEUM	F. L.	0	0	1,160	MC306	210 GAL	22	0	5	H-P
7071645A	KANE	PA	77/07/19	CRUDE OIL PETROLEUM	F. L.	0	0	0	TANK TRL	1470 GAL	22	0	5	H-P
7050272A	PETROLIA	KS	76/08/06	CRUDE OIL PETROLEUM	F. L.	0	0	3,643	TANK TRK	1680 GAL	22	0	5	H-P
7051301A	EDMONTON	KY	77/05/11	CRUDE OIL PETROLEUM	F. L.	0	0	13,000	TANK TRL	3150 GAL	0	0	5	H-P
•7081258A	KEMMERER	WY	77/08/12	CRUDE OIL PETROLEUM	F. L.	0	0	47,200	TANK TRK	0 GAL	22	0	5	H-P
•7081258B	KEMMERER	WY	77/08/12	CRUDE OIL PETROLEUM	F. L.	0	0	0	TANK TRL	4200 GAL	22	0	5	H-P
8011107A	ELY	NV	78/01/12	CRUDE OIL PETROLEUM	F. L.	0	0	2,679	TANK TRL	4200 GAL	2	22	5	H-P
8100615A	ROCK SPRINGS	WY	78/09/25	CRUDE OIL PETROLEUM	F. L.	0	0	5,000	MC306	6000 GAL	22	0	5	H-P
7060567A	BELFIELD	ND	77/05/31	CRUDE OIL PETROLEUM	F. L.	0	0	1,500	MC302	1890 GAL	22	0	5	H-P
•7111019A	DUCHESNE	UT	77/11/11	CRUDE OIL PETROLEUM	F. L.	0	0	8,000	MC306	42 GAL	22	0	5	H-P
7090635A	UPTOWN	WY	77/08/31	CRUDE OIL PETROLEUM	F. L.	0	0	1,357	TANK TRL	1956 GAL	22	0	5	H-P
7110919A	FRUITLAND	UT	77/11/07	CRUDE OIL PETROLEUM	F. L.	0	0	28,000	MC306	7500 GAL	22	0	5	H-P
8110323A	RED SPRINGS	TX	78/10/26	CRUDE OIL PETROLEUM	F. L.	0	0	28,000	MC300	7350 GAL	2	22	6	H-P
8121011A	WINFIELD	TN	78/12/08	CRUDE OIL PETROLEUM	F. L.	0	0	2,700	TANK TRL	600 GAL	22	0	5	H-P
3080228A	CALDERWOOD	TN	73/07/14	DISTILLATE	F. L.	0	0	4,500	MC305	0	2	0	5	H-H
3100262A	LEWISTOWN	PA	73/10/04	ETHER	F. L.	0	0	40	2P	0	17	0	5	H-H
8120641A	BRIDGEVIEW	IL	78/12/01	ETHYL ACETATE	F. L.	0	0	6,500	MC306	4200 GAL	22	0	5	H-H
3080294A	DUBLIN	VA	73/08/03	ETHYL ACETATE	F. L.	0	0	600	MC304	0	1	11	5	H-P
8030162A	MULBERRY	OK	78/02/02	ETHYL ACRYLATE INHB	F. L.	0	0	3,793	MC306	1400 GAL	22	0	5	H-H
4030298A	LOS ANGELES	CA	74/03/07	ETHYLENE DICHLORIDE	F. L.	0	0	1,500	MC306	0	2	0	5	H-H
7010201B	LAMAR	MO	76/12/16	ETHYLENE DICHLORIDE	F. L.	0	0	0	DRUM MTL	165 GAL	22	0	5	H-H
6090895A	COLDFOOT CAMP	AK	76/08/29	FLAM LIQ N.O.S.>73	F. L.	0	0	3,000	TANK TRL	1500 GAL	2	22	5	H-H
6110247A	HILL CITY	SD	76/10/26	FLAM LIQ N.O.S.>73	F. L.	0	0	0	TANK TRL	4300 GAL	2	22	5	H-P
•5040578B	PACOIMA	CA	75/04/10	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	12P	0	17	0	6	H-H
•5040578A	PACOIMA	CA	75/04/10	FLAM LIQUIDS N.O.S.	F. L.	0	95	200,000	BOTL PLS	0	17	0	6	H-H
3090335A	BELL TOWNSHIP	PA	73/08/30	FLAM LIQUIDS N.O.S.	F. L.	0	0	5,000	TANK TRL	0	17	0	5	H-H
5070274A	BROWNSVILLE	TX	75/06/27	FLAM LIQUIDS N.O.S.	F. L.	0	0	23,364	MC307	0	17	0	5	H-H
5070210A	BEAN STATION	TN	75/06/21	FLAM LIQUIDS N.O.S.	F. L.	0	0	17,000	MC304	0	17	0	5	H-H
5030088A	ALBUQUERQUE	NM	75/02/16	FLAM LIQUIDS N.O.S.	F. L.	0	0	130	PAIL PLS	0	17	0	5	H-H
5020455A	LOUDEN	TN	75/02/08	FLAM LIQUIDS N.O.S.	F. L.	0	0	5,690	MC307	0	17	0	5	H-H
6020510A	NEW ORLEANS	LA	76/02/02	FLAM LIQUIDS N.O.S.	F. L.	0	0	567	17E	110 GAL	22	0	5	H-H
3090404A	PLANT CITY	FL	73/09/14	FLAM LIQUIDS N.O.S.	F. L.	0	0	7,000	MC305	0	2	17	5	H-H
5010127A	RUSSELLVILLE	KY	74/12/18	FLAM LIQUIDS N.O.S.	F. L.	0	0	1,661	MC306	0	17	0	5	H-H
3090358A	BOSSIER CITY	LA	73/08/23	FLAM LIQUIDS N.O.S.	F. L.	0	0	1,600	MC306	0	17	0	5	H-H
5120024A	CIRCLEVILLE	OH	75/11/11	FLAM LIQUIDS N.O.S.	F. L.	0	0	1	MC303	0	17	0	5	H-H
6050451A	BEAUMONT	CA	76/04/28	FLAM LIQUIDS N.O.S.	F. L.	0	0	4,000	17E	468 GAL	3	22	5	H-H
5060572A	LOVE LOCK	NV	75/06/08	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	MC305	0	2	0	5	H-H
4090286A	SPRINGER	OK	74/09/04	FLAM LIQUIDS N.O.S.	F. L.	0	0	3,875	TANK TRL	0	11	17	5	H-H

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INCIDENTS INVOLVING VEHICULAR ACCIDENTS DURING JULY 1973 THRU DECEMBER 1978

REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
4070638A	PRT TOWNSEND	WA	74/06/04	FLAM LIQUIDS N.O.S.	F. L.	0	0	2,500	MC306	0	2	17	5	H-H
4040230A	REDDING	CA	74/04/01	FLAM LIQUIDS N.O.S.	F. L.	0	0	1,500	MC303	0	2	0	5	H-H
8030794A	BENTON	IL	78/01/25	FLAM LIQUIDS N.O.S.	F. L.	0	0	500	MC307	25 GAL	22	0	5	H-H
7100387A	BRIGHTON	MA	77/09/14	FLAM LIQUIDS N.O.S.	F. L.	0	1	0	DRUM MTL	4180 GAL	22	0	6	H-H
8031000A	LADYSMITH	VA	78/03/03	FLAM LIQUIDS N.O.S.	F. L.	0	0	25	37A	5 GAL	22	0	5	H-H
7070718A	SISSONVILLE	WV	77/06/16	FLAM LIQUIDS N.O.S.	F. L.	0	1	18,000	MC306	7500 GAL	22	0	6	H-H
8020913A	POMONA	CA	77/12/13	FLAM LIQUIDS N.O.S.	F. L.	0	0	30,000	TANK TRL	4500 GAL	22	0	5	H-H
8010417A	DULCE	NM	78/01/02	FLAM LIQUIDS N.O.S.	F. L.	0	0	70,000	TANK TRL	5000 GAL	2	22	5	H-H
8020448A	KEYSTONE JCT	SD	78/01/26	FLAM LIQUIDS N.O.S.	F. L.	0	0	2,100	MC305	5000 GAL	22	0	5	H-H
6110736A	VERSAILLES	IN	76/11/16	FLAM LIQUIDS N.O.S.	F. L.	0	0	17,500	MC303	6000 GAL	22	0	5	H-H
7121033B	LONGVIEW	WA	77/11/30	FLAM LIQUIDS N.O.S.	F. L.	0	0	5,000	MC305	3600 GAL	22	0	4	H-H
6090762A	TOOLIK	AK	76/07/01	FLAM LIQUIDS N.O.S.	F. L.	0	0	5,000	TANK TRL	8500 GAL	22	0	5	H-H
7071259A	OKLAHOMA CITY	OK	77/07/07	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	DRUM MTL	4500 GAL	22	0	5	H-H
7101253A	HAMMOND	IN	77/10/15	FLAM LIQUIDS N.O.S.	F. L.	0	0	2,000	DRUM MTL	220 GAL	22	0	5	H-H
8080763A	ALGIERS	LA	78/07/21	FLAM LIQUIDS N.O.S.	F. L.	0	1	7,000	MC306	3800 GAL	22	0	5	H-H
8110599B	BAKER	CA	78/10/30	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	CAN MTL	20 GAL	22	0	2	H-H
7020128A	WINSTON-SALEM	NC	77/01/09	FLAM LIQUIDS N.O.S.	F. L.	0	0	25,000	MC305	1700 GAL	2	22	5	H-H
8111456A	S BAY	FL	78/11/10	FLAM LIQUIDS N.O.S.	F. L.	0	0	2,000	MC306	4000 GAL	22	0	5	H-H
8120615A	GOODRICH	TX	78/10/19	FLAM LIQUIDS N.O.S.	F. L.	0	0	1,000	MC307	100 GAL	11	22	5	H-H
8081715A	HOPE	AR	78/07/29	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	17E	60 GAL	22	0	5	H-H
8090036A	LAPORTE	TX	78/08/08	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	MC307	5 GAL	22	0	5	H-H
8081204A	MENLO PARK	CA	78/06/14	FLAM LIQUIDS N.O.S.	F. L.	0	0	20,000	MC304	6200 GAL	22	0	5	H-H
7010632A	PALOS HEIGHTS	IL	77/01/18	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	TANK TRL	15000 GAL	22	0	5	H-P
4070604B	CHARLESTON	WV	74/06/19	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	TANK TRL	0	2	17	5	H-P
5040114A	DALLAS	TX	75/03/07	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	BLANK	0	17	0	1	H-P
4040323A	E BOSTON	MA	74/03/23	FLAM LIQUIDS N.O.S.	F. L.	0	0	10	TANK TRL	0	2	17	5	H-P
7010157A	HIGH POINT	NC	76/12/31	FLAM LIQUIDS N.O.S.	F. L.	0	0	0	TANK TRL	5200 GAL	22	0	5	H-P
5120067A	TRACY	CA	75/11/22	FLAM LIQUIDS N.O.S.	F. L.	0	0	16,500	TANK TRL	0	17	0	5	H-P
8081487A	DUBOIS	PA	78/08/16	FLAM LIQUIDS N.O.S.	F. L.	0	0	100	17E	20 GAL	2	22	5	H-P
7070303A	DALLAS	TX	77/06/28	FLAM LIQUIDS N.O.S.	F. L.	0	0	40,000	MC306	5000 GAL	22	0	5	H-P
7050284A	LEXINGTON	NC	77/04/26	FLAM LIQUIDS N.O.S.	F. L.	0	0	2,000	TANK TRL	600 GAL	2	22	5	H-P
8010501A	MOUTHCARD	KY	78/01/11	FLAM LIQUIDS N.O.S.	F. L.	0	0	1,039	TANK TRL	2000 GAL	22	0	5	H-P
8010449A	MAPLE SHADE	NJ	77/12/31	FLAM LIQUIDS N.O.S.	F. L.	0	0	5,000	MC306	600 GAL	22	0	5	H-P
7110911A	MENDEN HALL	MS	77/11/08	FLAM LIQUIDS N.O.S.	F. L.	1	0	55,000	MC306	6700 GAL	22	0	6	H-P
7061457A	ST JAMES	LA	77/06/18	FLAM LIQUIDS N.O.S.	F. L.	0	0	1,800	DRUM MTL	6300 GAL	2	22	5	H-P
7110058A	RAPID CITY	SD	77/10/17	FUEL AVIATION TURBN	F. L.	0	0	6,000	MC306	3000 GAL	22	0	5	H-H
6120811A	DIETRICH	AK	76/12/05	FUEL AVIATION TURBN	F. L.	0	0	0	TANK TRL	5800 GAL	22	0	5	H-H
7080744A	DALZELL	SC	77/08/04	FUEL AVIATION TURBN	F. L.	0	0	3,500	MC306	5204 GAL	22	0	5	H-H
6070423A	LOS ANGELES	CA	76/07/01	FUEL AVIATION TURBN	F. L.	0	0	120	MC307	5 GAL	22	0	5	H-H
7010546A	SWAINSBORO	GA	77/01/04	FUEL AVIATION TURBN	F. L.	0	0	0	TANK TRL	5000 GAL	22	0	5	H-H
6080851A	LAS CRUCES	NM	76/08/10	FUEL AVIATION TURBN	F. L.	0	0	4,400	MC306	8800 GAL	22	0	6	H-H
8020526A	AUGUSTA	GA	78/02/03	FUEL AVIATION TURBN	F. L.	0	0	145	MC306	286 GAL	22	0	5	H-H
8020543A	COLORADO SPGS	CO	78/01/26	FUEL AVIATION TURBN	F. L.	0	0	1,680	MC306	4600 GAL	22	0	5	H-H
8050282A	BRIGHTON	CO	78/03/25	FUEL AVIATION TURBN	F. L.	0	0	600	MC306	1200 GAL	22	0	5	H-H
6090832A	DELTA JCT	AK	76/02/02	FUEL AVIATION TURBN	F. L.	0	0	36,890	TANK TRL	9500 GAL	22	0	5	H-H
7111129A	OAKLAND	CA	77/11/08	FUEL AVIATION TURBN	F. L.	0	0	70,000	MC302	8100 GAL	22	0	5	H-H
7030252A	HONDO	NM	77/02/18	FUEL AVIATION TURBN	F. L.	0	0	3,037	MC306	9310 GAL	22	0	6	H-H
8070573A	HILL CITY	SD	78/06/23	FUEL AVIATION TURBN	F. L.	0	0	300	MC305	800 GAL	22	0	5	H-H
8070574A	RAPID CITY	SD	78/06/24	FUEL AVIATION TURBN	F. L.	0	0	2,400	MC306	4800 GAL	22	0	5	H-H
•8101538A	W LOS ANGELES	CA	78/10/02	FUEL AVIATION TURBN	F. L.	0	0	10,000	MC306	1245 GAL	22	0	5	H-H

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•8100688A	LOS ANGELES	CA	78/10/02	FUEL AVIATION TURBN	F. L.	0	0	0	TANK TRL	1245 GAL	2	22	5	H-H
8060657A	MCKENZIE	TN	78/06/02	FUEL AVIATION TURBN	F. L.	0	0	25,000	TANK TRK	3423 GAL	22	0	5	H-H
8120780A	LITTLE ROCK	AR	78/12/09	FUEL AVIATION TURBN	F. L.	0	0	3,500	MC300	215 GAL	22	0	5	H-H
7040602A	FALL RIVER	KS	74/12/24	FUEL AVIATION TURBN	F. L.	0	0	22,176	TANK TRL	8097 GAL	22	0	5	H-P
8050009A	PHOENIX	AZ	78/03/21	FUEL AVIATION TURBN	F. L.	0	0	35,000	MC306	2282 GAL	22	0	5	H-P
3100157A	GOBERNADOR	NM	73/09/27	SAS DRIPS HYDROCARB	F. L.	0	0	7,500	TANK TRL	0	17	0	5	H-P
4030448A	ISOLA	MS	74/03/18	GASOLINE	F. L.	0	0	3,100	MC305	0	17	0	5	H-H
4020019A	HILLSBORO	OH	74/01/14	GASOLINE	F. L.	0	0	468	MC306	0	17	0	5	H-H
3090072A	MARKLE	IN	73/07/30	GASOLINE	F. L.	0	0	2,770	MC302	0	17	0	5	H-H
4010416A	NAPLES	NY	74/01/24	GASOLINE	F. L.	0	0	2,000	TANK TRL	0	8	17	5	H-H
4010397A	PLAINFIELD	IN	74/01/15	GASOLINE	F. L.	0	0	13,592	MC306	0	17	0	6	H-H
4040161A	STUART	IA	74/03/29	GASOLINE	F. L.	0	0	6,000	MC305	0	17	0	5	H-H
4040177A	BIRMINGHAM	AL	74/03/30	GASOLINE	F. L.	0	0	12,500	TANK TRL	0	17	0	5	H-H
5100508A	CHISHOLM	MN	75/09/25	GASOLINE	F. L.	0	0	800	TANK TRL	0	2	0	5	H-H
4040234A	HOBBS	NM	74/03/15	GASOLINE	F. L.	0	2	0	MC305	0	17	0	3	H-H
4040235A	LOOGOOTEE	IN	74/04/02	GASOLINE	F. L.	0	0	103,167	MC306	0	2	0	2	H-H
5090431A	ROSWELL	NM	75/08/21	GASOLINE	F. L.	0	0	3,440	MC305	0	17	0	6	H-H
4040324A	ROSS	OH	74/03/30	GASOLINE	F. L.	0	0	945	MC306	0	17	0	5	H-H
4010364A	SHEEP SPGS	NM	74/01/14	GASOLINE	F. L.	0	0	1,785	TANK TRL	0	17	0	5	H-H
3080500A	KISSIMMEE	FL	73/08/13	GASOLINE	F. L.	0	1	25,000	MC306	0	17	0	5	H-H
4040373A	LAGOOTEE	IN	74/04/02	GASOLINE	F. L.	0	0	1,649	MC306	0	2	17	6	H-H
6040619B	HANKSVILLE	UT	76/04/12	GASOLINE	F. L.	0	0	2,000	MC305	2600 GAL	22	0	5	H-H
4040540A	PERU	KS	74/04/16	GASOLINE	F. L.	0	0	19,000	TANK TRL	0	17	0	5	H-H
4010357A	RICH CREEK	VA	73/12/13	GASOLINE	F. L.	0	0	2,680	MC306	0	17	0	5	H-H
4040569A	PAGOSA SPRNGS	CO	74/04/24	GASOLINE	F. L.	0	0	1,100	MC306	0	2	17	5	H-H
5100329A	CHATTANOOGA	TN	75/09/16	GASOLINE	F. L.	0	0	20,000	MC306	0	17	0	5	H-H
5120708A	SEQUIM	WA	75/12/13	GASOLINE	F. L.	0	0	3,500	MC306	0	2	0	5	H-H
4050005A	GORHAM	ME	74/04/23	GASOLINE	F. L.	0	0	0	TANK TRL	0	17	0	5	H-H
6020446A	MORRISTOWN	TN	76/02/06	GASOLINE	F. L.	0	0	3,000	TANK TRK	4000 GAL	22	0	5	H-H
5100289A	CAVE CITY	NC	75/10/22	GASOLINE	F. L.	0	0	8,500	TANK TRL	0	2	17	5	H-H
6040287B	POULSBO	WA	76/03/12	GASOLINE	F. L.	0	0	10,000	MC306	1642 GAL	2	22	5	H-H
4050110A	SARANAC	MI	74/05/02	GASOLINE	F. L.	0	0	9,000	TANK TRL	0	17	0	5	H-H
5100605A	ROCHESTER	PA	75/09/30	GASOLINE	F. L.	0	0	74	MC306	0	17	0	5	H-H
4050156A	SHARONVILLE	OH	74/04/24	GASOLINE	F. L.	0	0	4,166	MC302	0	17	0	6	H-H
5070344A	CURRENT	UT	75/06/25	GASOLINE	F. L.	0	0	1,300	MC302	0	17	0	5	H-H
6040287A	POULSBO	WA	76/03/12	GASOLINE	F. L.	0	0	10,000	MC302	1643 GAL	2	22	5	H-H
5070086A	FRANKLIN	KY	75/06/24	GASOLINE	F. L.	0	0	0	MC306	0	7	17	4	H-H
5100649A	FLORENCE	WI	75/10/04	GASOLINE	F. L.	0	0	24,000	MC306	0	17	0	6	H-H
4050597A	GLENWOOD	IA	74/04/25	GASOLINE	F. L.	0	0	40,000	MC305	0	2	0	5	H-H
5040729A	ASHLAND	KY	75/04/15	GASOLINE	F. L.	0	0	0	MC306	0	17	0	5	H-H
4050609A	GREENVILLE	TN	74/05/11	GASOLINE	F. L.	0	0	30,000	MC306	0	17	0	6	H-H
4050614A	CHARLESTON	WV	74/05/08	GASOLINE	F. L.	0	0	0	MC302	0	17	0	5	H-H
4010308A	EAST GLACIER	MT	74/01/14	GASOLINE	F. L.	0	0	703	MC302	0	2	0	5	H-H
4050631A	KEY LARGO	FL	74/05/20	GASOLINE	F. L.	0	0	169	MC306	0	17	0	5	H-H
4050644A	RICHMOND	VA	74/05/24	GASOLINE	F. L.	0	0	92	TANK TRL	0	17	0	5	H-H
4060027A	MINERAL	VA	74/05/29	GASOLINE	F. L.	0	0	30,000	MC306	0	17	0	6	H-H
5120627A	DUQUESNE	PA	75/12/12	GASOLINE	F. L.	0	0	100,000	MC306	0	17	0	5	H-H
4010307A	COOLIDGE	AZ	74/01/11	GASOLINE	F. L.	1	0	2,708	MC306	0	17	0	6	H-H
4060218A	STROUD	OK	74/05/23	GASOLINE	F. L.	0	0	35,000	17E	0	17	0	6	H-H
4010270A	ADAIR	IA	74/01/12	GASOLINE	F. L.	0	0	14,000	MC305	0	2	17	5	H-H

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4060323A	YAZOO CITY	MS	74/05/22	GASOLINE	F. L.	0	0	1,508	MC305	0	2	17	5	H-H
4060388A	HARRISBURG	PA	74/06/12	GASOLINE	F. L.	0	0	30	MC306	0	2	17	5	H-H
4060429A	NICKELSVILLE	VA	74/06/06	GASOLINE	F. L.	0	0	7,083	MC305	0	2	17	5	H-H
4060466A	LIBERAL	KS	74/05/30	GASOLINE	F. L.	0	0	0	MC305	0	17	0	5	H-H
4010240A	FLOWERY BR	GA	74/01/02	GASOLINE	F. L.	0	0	12,231	TANK TRL	0	2	0	6	H-H
5080191A	MUSKEGON	MI	75/07/23	GASOLINE	F. L.	0	0	4,400	TANK TRL	0	17	0	5	H-H
4060515A	ROMULUS	MI	74/06/11	GASOLINE	F. L.	0	0	43,418	MC306	0	17	0	5	H-H
4010237A	TCHULA	MS	73/11/26	GASOLINE	F. L.	0	0	205	MC305	0	17	0	5	H-H
4060572A	TAMPA	FL	74/06/13	GASOLINE	F. L.	0	0	20,000	MC306	0	17	0	5	H-H
4060653A	FRISCO	CO	74/04/19	GASOLINE	F. L.	0	0	0	TANK TRL	0	2	17	5	H-H
5120597A	PICKETT	WI	75/12/15	GASOLINE	F. L.	0	0	4,064	TANK TRL	0	17	0	5	H-H
5080165A	SPRINGFIELD	MO	75/07/21	GASOLINE	F. L.	0	0	1,764	MC307	0	17	0	5	H-H
4070313A	PRESTONSBURG	KY	74/07/01	GASOLINE	F. L.	0	0	3,000	TANK TRL	0	2	17	5	H-H
5061018A	WARREN	OH	75/06/12	GASOLINE	F. L.	0	0	12	MC301	0	10	17	5	H-H
5120590A	RANTOWLES	SC	75/12/06	GASOLINE	F. L.	0	0	6,000	TANK TRL	0	17	0	5	H-H
4070500A	DESOTA	GA	74/06/28	GASOLINE	F. L.	0	0	29,356	TANK TRL	0	2	0	5	H-H
4070545A	KERN COUNTRY	CA	74/06/28	GASOLINE	F. L.	0	0	9,600	TANK TRL	0	2	17	5	H-H
4070562A	LIBERAL	KS	74/05/30	GASOLINE	F. L.	0	0	0	MC305	0	17	0	5	H-H
5050079A	PARAMOUNT	CA	75/04/30	GASOLINE	F. L.	0	0	15	MC306	0	2	17	5	H-H
5060887A	CLEVELAND	OH	75/05/16	GASOLINE	F. L.	0	0	3,936	MC306	0	17	0	5	H-H
5120491A	ARLEE	MT	75/12/07	GASOLINE	F. L.	0	0	1,864	TANK TRL	0	2	17	5	H-H
4070633A	CLINTON	MI	74/07/01	GASOLINE	F. L.	0	0	7,000	TANK TRL	0	17	0	5	H-H
4070636A	STRONG	AR	74/07/10	GASOLINE	F. L.	0	0	2,039	MC306	0	2	17	5	H-H
4030377A	CHICAGO	IL	74/03/13	GASOLINE	F. L.	0	0	5	TANK TRL	0	17	0	5	H-H
6040169A	JUNCTION CITY	KS	76/03/29	GASOLINE	F. L.	0	0	2,000	MC306	2500 GAL	22	0	5	H-H
4070812A	AUSTIN	MN	74/07/22	GASOLINE	F. L.	0	0	15,980	TANK TRL	0	2	17	5	H-H
4010155A	SAGERSTOWN	PA	74/01/11	GASOLINE	F. L.	0	0	2	TANK TRL	0	17	0	5	H-H
4070836A	HENDERSON	NV	74/07/12	GASOLINE	F. L.	0	0	3,500	MC302	0	17	0	5	H-H
5120463A	WINNETT	MT	75/12/03	GASOLINE	F. L.	0	0	1,882	TANK TRL	0	2	17	5	H-H
5080905A	GARFIELD	VA	75/08/11	GASOLINE	F. L.	0	0	600	MC305	0	8	11	5	H-H
5060842A	S ROXANNE	IL	75/06/15	GASOLINE	F. L.	0	0	11,500	MC306	0	17	0	5	H-H
5120456A	WASHINGTON	PA	75/12/05	GASOLINE	F. L.	0	0	50,000	MC306	0	17	0	5	H-H
4080384A	MONROE	NJ	74/07/24	GASOLINE	F. L.	0	0	18,477	TANK TRL	0	2	17	5	H-H
4010127A	ATHENS	OH	73/12/31	GASOLINE	F. L.	0	0	9,462	MC305	0	2	17	6	H-H
4080504A	CRESTON JCT	WY	74/08/02	GASOLINE	F. L.	1	0	75,000	MC306	0	2	17	6	H-H
4080547A	BRAZOS	NM	74/08/03	GASOLINE	F. L.	0	0	0	MC305	0	17	0	5	H-H
5060760A	TRYON	NC	75/06/16	GASOLINE	F. L.	0	0	114	TANK TRL	0	7	8	5	H-H
6010141A	TOLEDO	OH	75/12/18	GASOLINE	F. L.	0	0	200	MC306	186 GAL	22	0	5	H-H
5120410A	STEVENS PASS	WA	75/12/02	GASOLINE	F. L.	0	0	1,100	TANK TRL	0	17	0	5	H-H
5060759B	NAVAJO	AZ	75/06/08	GASOLINE	F. L.	0	0	0	MC306	0	2	7	6	H-H
4090032A	HINDSVILLE	AR	74/08/24	GASOLINE	F. L.	0	0	6,595	TANK TRL	0	2	17	5	H-H
5050099A	INWOOD	NY	75/02/25	GASOLINE	F. L.	0	0	34	TANK TRL	0	17	0	5	H-H
4090147A	WATERLICK	VA	74/08/28	GASOLINE	F. L.	0	0	14,000	MC305	0	2	17	5	H-H
6020442A	WILLISTON	VT	74/04/29	GASOLINE	F. L.	0	0	0	TANK TRK	2000 GAL	22	0	5	H-H
5060759A	NAVAJO	AZ	75/06/08	GASOLINE	F. L.	0	0	30,000	MC305	0	2	7	6	H-H
5120334A	W FORK	IN	75/12/02	GASOLINE	F. L.	0	0	800	MC305	0	17	0	5	H-H
4030327A	BLUE ISLAND	IL	74/03/11	GASOLINE	F. L.	0	0	224	MC306	0	17	0	5	H-H
4010025A	VICTOR	NY	73/12/21	GASOLINE	F. L.	0	0	4,000	TANK TRL	0	17	0	5	H-H
3120311A	TAMPA	FL	73/11/28	GASOLINE	F. L.	0	0	15,000	MC306	0	11	0	5	H-H
4090400A	TURPIN	OK	74/08/16	GASOLINE	F. L.	0	0	445	MC304	0	17	0	5	H-H

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3070329A	MAGNOLIA	AR	73/07/05	GASOLINE	F. L.	0	0	50	TANK TRK	0	2	0	5	H-H
5100745A	HOBBS	NM	75/09/30	GASOLINE	F. L.	0	0	3,396	MC305	0	17	0	5	H-H
5100445A	LOUISVILLE	MS	75/09/27	GASOLINE	F. L.	0	0	2,000	MC305	0	17	0	5	H-H
3080410A	SANTA FE	NM	73/08/15	GASOLINE	F. L.	0	0	550	MC306	0	17	0	5	H-H
3120261A	CANTON	TX	73/12/08	GASOLINE	F. L.	0	0	440	MC306	0	17	0	5	H-H
3070581A	CANTON	NC	73/07/17	GASOLINE	F. L.	0	0	1,000	MC306	0	17	0	5	H-H
4100227A	ROANOKE	AL	74/09/24	GASOLINE	F. L.	0	0	15,000	MC306	0	2	0	5	H-H
5120200A	LLAVES	NM	75/11/14	GASOLINE	F. L.	0	0	7,991	MC305	0	17	0	5	H-H
6020460A	DAYTON	OH	76/01/28	GASOLINE	F. L.	0	0	12	MC306	30 GAL	22	0	5	H-H
3120187A	MADISON TWP	NJ	73/11/28	GASOLINE	F. L.	0	0	3,315	TANK TRL	0	17	0	5	H-H
3070183A	ATLANTA	GA	73/06/19	GASOLINE	F. L.	0	0	7,000	MC306	0	2	0	5	H-H
3090361A	HOMEWOOD	AL	73/08/24	GASOLINE	F. L.	0	0	11,000	MC305	0	2	0	5	H-H
3120160A	LAS CRUCES	NM	73/11/19	GASOLINE	F. L.	0	0	2,034	MC305	0	17	0	5	H-H
4100398A	PENSACOLA	FL	74/10/07	GASOLINE	F. L.	0	0	6,000	MC306	0	2	17	5	H-H
3070286A	DISPUTANTA	VA	73/06/30	GASOLINE	F. L.	0	0	105	MC305	0	17	0	5	H-H
4100545A	LAFITTE	LA	74/09/12	GASOLINE	F. L.	0	0	7,059	MC306	0	17	0	5	H-H
5090665A	AMARILLO	TX	75/09/04	GASOLINE	F. L.	0	1	3,300	MC306	0	17	0	5	H-H
•4100560A	CEDERVILLE	CA	74/08/29	GASOLINE	F. L.	0	0	5,000	MC305	0	2	17	5	H-H
•4100560B	CEDERVILLE	CA	74/08/29	GASOLINE	F. L.	0	0	0	MC305	0	2	17	5	H-H
4100573A	BONITA	LA	74/10/15	GASOLINE	F. L.	0	0	1,435	MC306	0	17	0	5	H-H
4100664A	COWPENS	SC	74/10/08	GASOLINE	F. L.	0	0	9,014	TANK TRL	0	2	17	5	H-H
4100673A	PITTSBURGH	PA	74/10/19	GASOLINE	F. L.	0	0	10	MC305	0	17	0	5	H-H
5120160A	INNIS	LA	75/11/15	GASOLINE	F. L.	0	0	12,939	MC306	0	17	0	6	H-H
5060298A	JACKSON CNTY	KY	75/06/02	GASOLINE	F. L.	1	1	35,000	TANK TRL	0	2	17	6	H-H
3120142A	EULESS	TX	73/12/04	GASOLINE	F. L.	0	0	541	MC306	0	17	0	5	H-H
4110098A	SPRINGFIELD	MO	74/10/28	GASOLINE	F. L.	0	0	6,200	TANK TRK	0	17	0	5	H-H
4110127A	WAVERLY	TN	74/10/19	GASOLINE	F. L.	0	0	15,000	MC306	0	2	0	5	H-H
4110128A	SODDY DAISY	TN	74/10/15	GASOLINE	F. L.	0	0	14,000	MC306	0	17	0	5	H-H
4110204A	FRANKVILLE	PA	74/03/29	GASOLINE	F. L.	0	0	25,712	TANK TRL	0	17	0	5	H-H
5120073A	IPSWICH	SD	75/11/06	GASOLINE	F. L.	0	0	1,800	TANK TRK	0	17	0	5	H-H
3120109A	RUTLEDGE	TN	73/11/09	GASOLINE	F. L.	0	0	1,689	MC305	0	17	0	5	H-H
5060245A	EMMETSBURG	IA	75/04/09	GASOLINE	F. L.	0	0	510	MC306	0	17	0	5	H-H
5090513A	COLUMBUS	MS	75/08/29	GASOLINE	F. L.	0	0	1,945	MC306	0	17	0	5	H-H
3070305A	WICHITA	KS	73/07/05	GASOLINE	F. L.	0	0	300	MC305	0	17	0	5	H-H
4110396A	WOODVILLE	MS	74/10/29	GASOLINE	F. L.	0	0	1,760	TANK TRL	0	17	0	5	H-H
4110444A	CALIENTE	NV	74/10/31	GASOLINE	F. L.	0	0	21,000	MC305	0	17	0	5	H-H
4110444B	CALIENTE	NV	74/10/31	GASOLINE	F. L.	0	0	0	MC306	0	17	0	5	H-H
3090375A	SPANISH FORT	AL	73/08/30	GASOLINE	F. L.	0	0	772	MC306	0	17	0	5	H-H
6010500A	SUMITON	AL	76/01/12	GASOLINE	F. L.	0	0	9,450	TANK TRK	3500 GAL	2	22	5	H-H
4110519A	DIXON	MT	74/11/12	GASOLINE	F. L.	0	0	6,600	MC302	0	2	17	5	H-H
3080328A	SCOTTSVILLE	VA	73/08/21	GASOLINE	F. L.	0	1	10,000	TANK TRK	0	17	0	5	H-H
4110532A	LOUISVILLE	KY	74/11/12	GASOLINE	F. L.	0	0	18,000	TANK TRK	0	17	0	5	H-H
4110566A	N PLATTE	NE	74/10/07	GASOLINE	F. L.	1	0	250,000	MC305	0	2	17	6	H-H
3080317A	COPPERHILL	TN	73/07/27	GASOLINE	F. L.	0	0	25,000	MC306	0	2	7	5	H-H
5120047A	OLD TOWN	ME	75/11/17	GASOLINE	F. L.	0	0	20,000	TANK TRL	0	2	0	5	H-H
3120041A	TRAVERSE CITY	MI	73/10/10	GASOLINE	F. L.	0	0	5,700	TANK TRL	0	17	0	5	H-H
6030450A	YATES CENTER	KS	76/03/04	GASOLINE	F. L.	0	0	150	TANK TRK	400 GAL	22	0	5	H-H
3080269A	HAINES CITY	FL	73/07/24	GASOLINE	F. L.	0	0	11,500	TANK TRK	0	2	0	5	H-H
6040376A	CONNEAUT	OH	76/04/06	GASOLINE	F. L.	0	0	130	MC306	150 GAL	19	22	5	H-H
3120012A	TETONIA	ID	73/10/22	GASOLINE	F. L.	0	0	130	MC306	0	11	0	5	H-H

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4120152A	PHOENIX	AZ	74/11/30	GASOLINE	F. L.	2	1	20,000	MC303	0	17	0	6	H-H
4120161A	READING	PA	74/11/27	GASOLINE	F. L.	0	0	15	MC306	0	17	0	5	H-H
3110455A	PETALUMA	CA	73/11/21	GASOLINE	F. L.	0	0	2,000	MC306	0	11	0	5	H-H
5090464A	GLADE	KS	75/08/28	GASOLINE	F. L.	0	0	35,000	MC304	0	17	0	6	H-H
3090209A	SUPERIOR	AZ	73/07/17	GASOLINE	F. L.	0	0	670	17E	0	2	17	5	H-H
4120382A	WAUKON	IA	74/10/30	GASOLINE	F. L.	0	0	44	MC305	0	11	0	5	H-H
4120442A	OSKALOOSA	KS	74/12/09	GASOLINE	F. L.	0	0	5,028	TANK TRL	0	17	0	5	H-H
5060235A	BELZONI	MS	75/05/29	GASOLINE	F. L.	0	0	6,000	TANK TRL	0	17	0	5	H-H
3080143A	GALLUP	NM	73/07/19	GASOLINE	F. L.	0	0	3,300	MC306	0	2	0	5	H-H
3090360A	CALHOUN	TN	73/08/10	GASOLINE	F. L.	0	0	5,000	MC305	0	2	0	5	H-H
5100788A	TAYLOR	MO	75/10/03	GASOLINE	F. L.	0	0	0	TANK TRL	0	17	0	6	H-H
6040938A	BELVEDERE	SC	76/04/15	GASOLINE	F. L.	0	0	2,500	MC306	5649 GAL	22	0	5	H-H
6050040A	CLOTHIER	WV	76/03/24	GASOLINE	F. L.	0	0	0	MC305	2570 GAL	22	0	5	H-H
5050101A	DUPREE	SD	75/04/23	GASOLINE	F. L.	0	0	10	MC306	0	10	17	5	H-H
5010067A	ISSAQUAH	WA	74/12/26	GASOLINE	F. L.	0	0	2,100	TANK TRK	0	17	0	5	H-H
5010106A	SCOTTS BLUFF	NE	74/05/15	GASOLINE	F. L.	0	0	2,000	MC305	0	17	0	5	H-H
6040403A	SANDERS	AZ	76/03/31	GASOLINE	F. L.	0	0	0	TANK TRK	280 GAL	22	0	5	H-H
4030176A	TULSA	OK	74/03/04	GASOLINE	F. L.	0	0	2,000	TANK TRL	0	17	0	5	H-H
6030439A	NAPLES	FL	76/02/23	GASOLINE	F. L.	0	0	5,000	MC306	8538 GAL	22	0	5	H-H
4030130A	TUNNEL HILL	GA	74/02/13	GASOLINE	F. L.	0	0	25,000	MC305	0	11	0	5	H-H
6050190A	BLYTHE	CA	76/04/19	GASOLINE	F. L.	0	0	75	17E	110 GAL	3	22	5	H-H
5090240A	MIDDLEBURG	VA	75/08/29	GASOLINE	F. L.	0	0	15,000	MC306	0	17	0	5	H-H
6020201B	SHIPROCK	NM	76/01/08	GASOLINE	F. L.	0	0	22,788	MC306	5000 GAL	2	22	5	H-H
5010195A	LAKE GENEVA	WI	74/12/26	GASOLINE	F. L.	0	0	7	MC305	0	17	0	5	H-H
5010202A	CHINLE	AZ	74/12/24	GASOLINE	F. L.	0	0	4,300	TANK TRL	0	17	0	5	H-H
5010327A	DES MOINES	IA	74/11/22	GASOLINE	F. L.	0	0	2	TANK TRL	0	17	0	5	H-H
5010328A	REYNOLDS	IL	74/12/12	GASOLINE	F. L.	0	0	2,378	MC305	0	17	0	5	H-H
5010332A	DES MOINES	IA	74/11/22	GASOLINE	F. L.	0	0	2	TANK TRL	0	17	0	5	H-H
5010353A	DUBACH	LA	74/12/30	GASOLINE	F. L.	0	0	2,800	MC306	0	2	7	6	H-H
5010391A	BYRON	CA	73/08/17	GASOLINE	F. L.	0	0	2,760	TANK TRL	0	2	17	5	H-H
5010401A	CHARLESTON	SC	75/01/07	GASOLINE	F. L.	0	0	2,500	MC306	0	2	17	5	H-H
3080112A	ATLANTA	GA	73/07/27	GASOLINE	F. L.	1	0	35,000	TANK TRK	0	17	0	6	H-H
5010457A	TAZEWELL	VA	75/01/13	GASOLINE	F. L.	0	0	1,485	TANK TRL	0	2	17	5	H-H
5010461A	LEXINGTON	KY	75/01/11	GASOLINE	F. L.	0	0	15,000	TANK TRL	0	17	0	5	H-H
5110762A	CULLMAN	AL	75/10/22	GASOLINE	F. L.	0	0	12,000	TANK TRL	0	2	14	5	H-H
3110313A	SPRINGFIELD	OH	73/10/30	GASOLINE	F. L.	0	0	4	MC305	0	17	0	5	H-H
5010594A	DIXON	MT	74/11/12	GASOLINE	F. L.	0	0	7,700	TANK TRL	0	17	0	5	H-H
5010599A	MILWAUKEE	WI	75/01/16	GASOLINE	F. L.	0	0	1	MC305	0	17	0	5	H-H
5010668A	ETHRIDGE	MT	75/01/19	GASOLINE	F. L.	0	0	10,400	MC305	0	2	17	5	H-H
5010668B	ETHRIDGE	MT	75/01/19	GASOLINE	F. L.	0	0	0	MC302	0	2	17	5	H-H
5070322A	E MORRILTON	AR	75/06/26	GASOLINE	F. L.	0	0	2,500	MC307	0	17	0	5	H-H
5110280A	LAMONT	CA	75/10/25	GASOLINE	F. L.	0	0	700	TANK TRL	0	2	17	5	H-H
5110266A	W MILWAUKEE	WI	75/10/14	GASOLINE	F. L.	0	0	400	MC305	0	17	0	5	H-H
5110222A	ARLINGTON	VA	75/11/07	GASOLINE	F. L.	0	0	0	TANK TRL	0	17	0	5	H-H
3080061A	CUSTER	SD	73/07/29	GASOLINE	F. L.	0	1	0	MC305	0	17	0	6	H-H
3110302A	BORDULAC	ND	73/10/30	GASOLINE	F. L.	0	0	1,000	MC305	0	17	0	5	H-H
5090123A	DISPUTANTA	VA	75/08/25	GASOLINE	F. L.	0	1	50,000	MC306	0	17	0	6	H-H
6020815A	LA GRANDE	OR	76/02/19	GASOLINE	F. L.	0	0	12,500	MC305	2365 GAL	22	0	5	H-H
3110251A	HALEYVILLE	AL	73/11/05	GASOLINE	F. L.	0	0	3,400	MC306	0	2	0	5	H-H
5010730A	MYAKKA CITY	FL	74/12/27	GASOLINE	F. L.	0	0	10,000	MC306	0	2	17	5	H-H

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3110250A	SANFORD	FL	73/10/30	GASOLINE	F. L.	0	0	40,000	MC306	0	17	0	6	H-H
5020093A	EL PASO	TX	75/01/22	GASOLINE	F. L.	0	0	35	MC306	0	17	0	5	H-H
3110167A	COVINGTON	TN	73/11/03	GASOLINE	F. L.	0	0	900	MC305	0	17	0	5	H-H
3110137A	SEMINOLE	FL	73/11/01	GASOLINE	F. L.	0	0	300	MC306	0	17	0	5	H-H
5080786A	MORELAND HLS	OH	75/01/27	GASOLINE	F. L.	0	0	3,000	MC306	0	17	0	5	H-H
5090463A	OLPE	KS	75/08/09	GASOLINE	F. L.	0	0	103	MC306	0	17	0	5	H-H
5020147A	BELFAST	OH	75/01/24	GASOLINE	F. L.	0	0	12,530	MC306	0	17	0	5	H-H
6020764A	LANSING	MI	76/02/10	GASOLINE	F. L.	0	0	50	MC303	100 GAL	22	0	5	H-H
4020055A	SKELLYTOWN	TX	74/01/12	GASOLINE	F. L.	0	0	1,400	MC305	0	17	0	5	H-H
5020344A	NEW ORLEANS	LA	75/02/06	GASOLINE	F. L.	0	0	9,459	TANK TRL	0	17	0	5	H-H
3110071A	TUSCALOOSA	AL	73/10/16	GASOLINE	F. L.	0	0	1,185	MC306	0	11	17	5	H-H
5050436A	LAKELAND	FL	75/04/29	GASOLINE	F. L.	0	0	57,500	MC306	0	17	0	5	H-H
5090048A	DAVENPORT	AL	75/08/13	GASOLINE	F. L.	0	0	18,500	MC306	0	2	17	5	H-H
3070634A	SHOWLOW	AZ	73/07/02	GASOLINE	F. L.	0	0	28,000	TANK TRL	0	2	0	5	H-H
3110048A	DEERPARK	AL	73/10/24	GASOLINE	F. L.	0	0	0	TANK TRL	0	17	0	5	H-H
6020697A	JAYESS	MS	76/02/13	GASOLINE	F. L.	0	0	5,940	MC305	2900 GAL	2	22	5	H-H
6010584A	HICKORY FLAT	GA	76/01/06	GASOLINE	F. L.	0	0	10,816	MC306	1050 GAL	11	22	5	H-H
5070525A	JONESVILLE	VA	75/07/13	GASOLINE	F. L.	0	0	2,925	MC306	0	17	0	5	H-H
6010573A	INDIAN HEAD	MD	76/01/16	GASOLINE	F. L.	0	1	50,000	MC306	8000 GAL	22	0	6	H-H
4020364A	WOLF CRK PASS	CA	74/01/31	GASOLINE	F. L.	0	0	0	TANK TRL	0	2	17	5	H-H
5020480A	S FORK	CO	75/01/31	GASOLINE	F. L.	0	0	109	MC306	0	17	0	5	H-H
3100465A	IRVING	TX	73/10/08	GASOLINE	F. L.	0	0	371	TANK TRL	0	2	0	5	H-H
5020542A	BRAZIL	IN	75/01/13	GASOLINE	F. L.	0	0	1,939	MC306	0	17	0	5	H-H
3100370A	COLUMBUS	GA	73/10/04	GASOLINE	F. L.	0	0	65,000	MC305	0	2	17	6	H-H
5050348A	HOLLY SPRINGS	MS	75/05/02	GASOLINE	F. L.	0	0	1,478	MC306	0	17	0	5	H-H
4020316A	PENDLETON	OR	74/02/01	GASOLINE	F. L.	0	0	118	MC305	0	17	0	5	H-H
3100356A	CLINTON	MO	73/10/10	GASOLINE	F. L.	0	0	800	TANK TRL	0	17	0	5	H-H
3070351A	MT PLEASANT	MI	73/07/06	GASOLINE	F. L.	0	0	3,900	TANK TRL	0	17	0	5	H-H
5030270B	TURPIN	OK	75/01/11	GASOLINE	F. L.	0	0	0	MC306	0	17	0	5	H-H
3090445A	LAKELAND	FL	73/08/27	GASOLINE	F. L.	0	0	150	MC306	0	2	0	5	H-H
3070617A	WADDINGTON	NY	73/07/16	GASOLINE	F. L.	0	0	1,000	TANK TRL	0	2	0	5	H-H
5030423A	JACKSONVILLE	NC	75/02/28	GASOLINE	F. L.	0	0	5,550	TANK TRL	0	17	0	5	H-H
5030471A	RICHMOND	VA	75/03/01	GASOLIN	F. L.	0	0	5,000	MC306	0	17	0	5	H-H
5030534A	BOISE	ID	75/02/26	GASOLINE	F. L.	0	0	200	TANK TRK	0	17	0	5	H-H
5030534B	BOISE	ID	75/02/26	GASOLINE	F. L.	0	0	0	TANK TRL	0	17	0	5	H-H
5030629A	PARRISH	FL	75/03/06	GASOLINE	F. L.	0	0	25,000	MC306	0	2	17	5	H-H
3100349A	BASTROP	LA	73/10/05	GASOLINE	F. L.	0	0	1,000	TANK TRL	0	17	0	5	H-H
6040619A	HANKSVILLE	UT	76/04/12	GASOLINE	F. L.	0	0	856	MC302	190 GAL	22	0	5	H-H
3070015A	MONCKS CORNER	SC	73/06/18	GASOLINE	F. L.	0	0	12,000	TANK TRL	0	2	0	5	H-H
3070614A	ST JOHNS	AZ	73/06/15	GASOLINE	F. L.	0	0	4,000	MC303	0	2	0	5	H-H
5040016A	CAMP VERDE	AZ	74/09/29	GASOLINE	F. L.	0	0	150	MC306	0	17	0	5	H-H
5040020A	KLEIN	MT	75/03/26	GASOLINE	F. L.	0	0	7,100	MC306	0	17	0	5	H-H
5040024A	ELY	NV	75/03/22	GASOLINE	F. L.	0	0	0	MC306	0	2	11	5	H-H
5040103A	ADAMSVILLE	MI	75/03/20	GASOLINE	F. L.	0	0	1,540	MC306	0	2	17	5	H-H
5040239A	MONTICELLO	FL	75/03/19	GASOLINE	F. L.	0	0	2,700	MC305	0	17	0	5	H-H
3100244A	HAZELHURST	GA	73/09/25	GASOLINE	F. L.	1	0	45,000	MC306	0	17	0	6	H-H
5070363A	UNION CITY	TN	75/07/07	GASOLINE	F. L.	0	0	600	MC306	0	17	0	5	H-H
5050168A	MAPLETON	IL	75/04/18	GASOLINE	F. L.	0	0	1,800	MC306	0	2	17	5	H-H
5040307A	BROOKHAVEN	MS	75/04/01	GASOLINE	F. L.	0	0	363	TANK TRL	0	17	0	5	H-H
5040344A	MONROE	OH	75/03/29	GASOLINE	F. L.	0	0	640	MC306	0	11	17	5	H-H

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4020261A	ESTERO	FL	74/02/06	GASOLINE	F. L.	0	0	20,000	MC306	0	17	0	5	H-H
5040515A	NEW CASTLE	PA	75/04/16	GASOLINE	F. L.	0	0	45,000	MC306	0	17	0	5	H-H
3100020A	BIG SANDY	TX	73/09/22	GASOLINE	F. L.	1	0	0	TANK TRL	0	2	17	6	H-H
5070364A	NASHVILLE	TN	75/06/27	GASOLINE	F. L.	0	0	2,000	MC306	0	17	0	5	H-H
7030106A	STEGALL	NE	74/05/15	GASOLINE	F. L.	0	0	2,000	MC306	4000 GAL	2	22	5	H-H
7030108A	MADISON	IN	77/02/10	GASOLINE	F. L.	0	0	3,000	MC306	6125 GAL	2	22	5	H-H
6091051A	WEBBER FALLS	OK	76/09/02	GASOLINE	F. L.	0	0	135	MC306	272 GAL	11	22	5	H-H
•6050719A	CRAIGMONT	ID	76/05/07	GASOLINE	F. L.	0	0	1,025	MC306	2050 GAL	2	22	5	H-H
8050089A	SPARTANBURG	SC	78/04/06	GASOLINE	F. L.	0	0	32,000	MC305	9000 GAL	22	0	6	H-H
7020715A	HOLLY GROVE	AR	77/02/11	GASOLINE	F. L.	0	0	1,500	MC300	3000 GAL	22	0	5	H-H
8041406A	WILLARD	OH	78/02/09	GASOLINE	F. L.	0	0	2,000	MC300	5000 GAL	22	0	5	H-H
7090873A	TAYLORSVILLE	KY	77/09/09	GASOLINE	F. L.	0	0	3,500	MC305	6000 GAL	22	0	5	H-H
6110686A	HAMPTON	AR	76/11/06	GASOLINE	F. L.	0	0	1,600	MC306	2650 GAL	22	0	5	H-H
6091058A	HOMER	MI	76/09/22	GASOLINE	F. L.	0	0	50	MC303	100 GAL	22	0	5	H-H
6090963A	S JACKSON	WV	76/08/18	GASOLINE	F. L.	0	0	520	MC305	1000 GAL	22	0	5	H-H
7030341A	MARKLE	IN	77/02/18	GASOLINE	F. L.	0	0	3,000	MC306	8000 GAL	22	0	5	H-H
7120023A	MESA	AZ	77/11/12	GASOLINE	F. L.	0	0	8	MC306	15 GAL	2	22	5	H-H
8051562A	STRATHAM	NH	78/05/06	GASOLINE	F. L.	0	0	28,500	MC306	8000 GAL	2	22	5	H-H
6110693A	RICHWOOD	OH	76/09/27	GASOLINE	F. L.	0	0	40	MC306	75 GAL	22	0	5	H-H
8041039A	MALVERN	AR	78/04/10	GASOLINE	F. L.	0	0	3,950	MC306	7900 GAL	22	0	1	H-H
8040975A	CAMDEN	NJ	78/03/31	GASOLINE	F. L.	0	0	0	MC306	147 GAL	22	0	5	H-H
8051468A	HANNA	WY	78/05/18	GASOLINE	F. L.	0	0	17,000	MC305	3110 GAL	22	0	5	H-H
7030443A	INDIANA	PA	77/02/25	GASOLINE	F. L.	0	0	3,000	MC306	7000 GAL	2	22	5	H-H
7030027B	LOS MOLINOS	CA	77/02/14	GASOLINE	F. L.	0	0	2,000	MC306	1000 GAL	2	22	5	H-H
6110696A	CINIZA	NM	76/10/30	GASOLINE	F. L.	0	0	2,700	MC305	6155 GAL	22	0	5	H-H
7030027A	LOS MOLINOS	CA	77/02/14	GASOLINE	F. L.	0	0	2,000	MC306	1163 GAL	2	22	5	H-H
7030651A	KADOKA	SD	77/03/11	GASOLINE	F. L.	0	0	40,000	MC302	6000 GAL	2	22	5	H-H
8040773A	MORRISVILLE	UT	78/04/07	GASOLINE	F. L.	0	0	30,000	MC306	5500 GAL	22	0	5	H-H
7030803A	SHELBYVILLE	KY	75/10/10	GASOLINE	F. L.	0	0	9,000	MC306	6000 GAL	22	0	5	H-H
8010567A	MILWAUKEE	WI	77/12/27	GASOLINE	F. L.	0	0	939	MC305	1790 GAL	22	0	5	H-H
7031134A	GARLAND	PA	77/03/04	GASOLINE	F. L.	0	0	12	MC306	30 GAL	22	0	5	H-H
7031147A	NAUGATUCK	CT	77/03/11	GASOLINE	F. L.	0	0	163	MC306	308 GAL	2	22	5	H-H
7010680A	BAKERSFIELD	CA	77/01/06	GASOLINE	F. L.	0	0	1,900	TANK TRL	399 GAL	22	0	5	H-H
8040382A	S POINT	OH	78/03/28	GASOLINE	F. L.	0	0	5,000	MC306	2550 GAL	22	0	5	H-H
7010654A	SOMERVILLE	TN	77/01/17	GASOLINE	F. L.	0	0	25,000	TANK TRL	1000 GAL	22	0	5	H-H
6090295B	MANILA	UT	76/08/23	GASOLINE	F. L.	0	0	0	MC305	4500 GAL	2	22	6	H-H
6090295A	MANILA	UT	76/08/23	GASOLINE	F. L.	0	0	8,000	MC302	4600 GAL	2	22	6	H-H
7040236A	REMBERT	SC	77/03/29	GASOLINE	F. L.	0	0	190	MC306	150 GAL	22	0	5	H-H
7020578A	WINCHESTER	KY	77/02/12	GASOLINE	F. L.	0	0	2,000	TANK TRL	6000 GAL	22	0	5	H-H
7020428A	LAS VEGAS	NV	77/01/30	GASOLINE	F. L.	0	0	25,000	MC306	4700 GAL	2	22	6	H-H
•7111080B	EUGENE	OR	77/10/30	GASOLINE	F. L.	0	0	6,000	MC305	4000 GAL	17	22	6	H-H
6081215B	GALLUP	NM	76/08/03	GASOLINE	F. L.	0	0	26,235	MC306	1232 GAL	22	0	5	H-H
7040256A	TINICUM	PA	77/03/24	GASOLINE	F. L.	0	0	5,000	MC306	2000 GAL	22	0	5	H-H
6120581A	LEXINGTON	KY	76/12/07	GASOLINE	F. L.	0	0	9	MC306	20 GAL	2	22	5	H-H
6081215A	GALLUP	NM	76/08/03	GASOLINE	F. L.	0	0	26,235	MC305	1233 GAL	22	0	5	H-H
•7111080A	EUGENE	OR	77/10/30	GASOLINE	F. L.	0	0	6,000	MC305	4000 GAL	17	22	6	H-H
8020046A	NATCHEZ	MS	78/01/16	GASOLINE	F. L.	0	0	4,000	MC306	8100 GAL	22	0	6	H-H
7040751A	TAZEWELL	VA	77/04/07	GASOLINE	F. L.	0	0	25,000	MC305	6000 GAL	22	0	1	H-H
6081188A	RIDGEWAY	SC	76/08/21	GASOLINE	F. L.	0	0	450	MC306	920 GAL	22	0	5	H-H
7040843A	CABAZON	CA	77/04/18	GASOLINE	F. L.	0	0	1,200	TANK TRL	1800 GAL	22	0	5	H-H

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6050830A	WHITEWATER	WI	76/05/15	GASOLINE	F. L.	0	0	1,951	MC306	4336 GAL	22	0	5	H-H
•6050719B	CRAIGMONT	ID	76/05/07	GASOLINE	F. L.	0	0	1,025	MC306	2050 GAL	2	22	5	H-H
8050264A	GRENADA	MS	78/04/18	GASOLINE	F. L.	0	0	840	MC306	2213 GAL	22	0	5	H-H
8051599A	LOWDEN	MN	78/03/30	GASOLINE	F. L.	0	0	4,000	MC305	4800 GAL	2	22	5	H-H
7110813A	SELBY	SD	77/11/08	GASOLINE	F. L.	0	0	15,000	MC302	6000 GAL	22	0	5	H-H
7101033A	LITTLE ROCK	AR	77/10/08	GASOLINE	F. L.	0	0	65,000	MC300	8000 GAL	22	0	5	H-H
7041004A	CITY UNKNOWN	CO	77/04/02	GASOLINE	F. L.	0	0	550	MC306	1000 GAL	22	0	5	H-H
8030541A	BANDON	OR	78/02/15	GASOLINE	F. L.	0	0	10,000	MC305	6300 GAL	22	0	5	H-H
6050845A	STILWELL	OK	76/05/11	GASOLINE	F. L.	0	0	3,444	TANK TRK	7100 GAL	22	0	5	H-H
8020343A	EMBODEN	AR	78/01/24	GASOLINE	F. L.	0	0	300	MC306	600 GAL	22	0	5	H-H
8040195A	NEW CUYAMA	CA	77/12/29	GASOLINE	F. L.	0	0	2,192	TANK TRK	2016 GAL	22	0	5	H-H
8030163A	MACKSVILLE	KS	78/02/20	GASOLINE	F. L.	0	0	300	MC306	635 GAL	22	0	5	H-H
8020342A	YELLVILLE	AR	78/01/26	GASOLINE	F. L.	0	0	4,025	MC306	8050 GAL	22	0	5	H-H
8040183A	WINFIELD	AL	78/03/22	GASOLINE	F. L.	0	0	1,115	MC306	2231 GAL	22	0	5	H-H
7050507A	DUSHORE	PA	75/04/02	GASOLINE	F. L.	0	0	20	MC305	32 GAL	22	0	5	H-H
6080979A	S HILL	VA	76/08/23	GASOLINE	F. L.	0	0	2,213	TANK TRK	4096 GAL	22	0	5	H-H
7030017A	PHOENIX	AZ	74/10/07	GASOLINE	F. L.	0	0	1,800	MC305	4600 GAL	2	22	5	H-H
8020571A	SPRINGER	NM	78/01/24	GASOLINE	F. L.	0	0	2,531	MC305	4560 GAL	22	0	5	H-H
6080666A	CALAIS	ME	76/07/16	GASOLINE	F. L.	0	0	200	TANK TRL	65 GAL	22	0	5	H-H
8010156A	RUDD CROSSING	MS	77/01/26	GASOLINE	F. L.	0	0	2,837	MC306	3406 GAL	22	0	5	H-H
7050731A	ST JOSEPH	IL	77/04/28	GASOLINE	F. L.	0	0	2,437	MC306	4774 GAL	22	0	5	H-H
6080656A	BELLE PLAINE	MN	76/08/11	GASOLINE	F. L.	0	0	40,000	MC305	8000 GAL	22	0	6	H-H
7010577A	TEMPE	AZ	77/01/10	GASOLINE	F. L.	0	0	40	MC305	80 GAL	22	0	5	H-H
8010144A	LESLIE	AR	77/04/06	GASOLINE	F. L.	0	0	4,000	MC306	8000 GAL	22	0	5	H-H
7050916A	TAYLOR	MO	77/04/22	GASOLINE	F. L.	0	0	1,000	MC305	2075 GAL	22	0	5	H-H
7051034A	EPWORTH	IA	77/04/26	GASOLINE	F. L.	0	0	13,350	MC305	7700 GAL	2	22	5	H-H
7051100A	ASHEVILLE	NC	77/05/07	GASOLINE	F. L.	0	0	31,000	TANK TRL	5000 GAL	17	22	2	H-H
8051605A	STEAMBOAT SPG	CO	78/03/31	GASOLINE	F. L.	0	0	1,900	MC306	240 GAL	22	0	5	H-H
7051136A	PARKSVILLE	SC	77/05/14	GASOLINE	F. L.	1	0	42,000	MC306	8500 GAL	22	0	6	H-H
7051137A	WILLIAMSTON	SC	77/05/18	GASOLINE	F. L.	1	0	50,000	MC306	8200 GAL	22	0	6	H-H
8060161A	PLEASANT RDG	KY	78/05/17	GASOLINE	F. L.	0	0	400	MC305	780 GAL	22	0	5	H-H
6100615A	MOREAU	NY	76/09/04	GASOLINE	F. L.	0	0	4,750	TANK TRK	5500 GAL	2	22	5	H-H
6110837A	MATEWAN	WV	76/10/22	GASOLINE	F. L.	0	0	30,000	MC306	5200 GAL	22	0	5	H-H
6080034A	SPRING VALLEY	NY	76/02/03	GASOLINE	F. L.	0	0	94	MC305	175 GAL	22	0	5	H-H
7110692A	LITCHFIELD	ME	77/11/11	GASOLINE	F. L.	0	0	3,500	MC306	610 GAL	22	0	5	H-H
7121099A	LODI	NJ	77/12/16	GASOLINE	F. L.	0	0	1,645	MC306	250 GAL	22	0	5	H-H
8030447A	GLENDO	WY	78/02/25	GASOLINE	F. L.	0	0	624	MC306	1600 GAL	22	0	5	H-H
7060254B	MACON	MS	77/05/21	GASOLINE	F. L.	0	0	1,361	MC306	2497 GAL	22	0	5	H-H
7060255A	MOULTON	AL	77/05/21	GASOLINE	F. L.	0	0	1,150	MC306	2296 GAL	22	0	5	H-H
6070986A	GALLUP	NM	76/06/12	GASOLINE	F. L.	0	0	4,000	MC306	8000 GAL	22	0	5	H-H
7110518A	ALEXANDRIA	VA	77/11/04	GASOLINE	F. L.	0	0	40,000	MC306	4233 GAL	22	0	5	H-H
7021002A	ELLENWOOD	KS	77/02/02	GASOLINE	F. L.	0	0	2,500	MC306	5700 GAL	2	22	5	H-H
7010526A	PUEBLO	CO	77/01/11	GASOLINE	F. L.	0	0	700	MC306	200 GAL	22	0	5	H-H
7060720A	LAKE CITY	FL	77/06/03	GASOLINE	F. L.	0	0	1,000	TANK TRL	19874 GAL	22	0	5	H-H
7060826A	DALHART	TX	77/05/09	GASOLINE	F. L.	0	0	50	MC306	100 GAL	22	0	5	H-H
7061031A	LOCKHART	SC	77/06/07	GASOLINE	F. L.	0	1	45,000	MC306	6660 GAL	22	0	8	H-H
7100470A	HOLLISTER	ID	77/09/24	GASOLINE	F. L.	0	0	1,700	TANK TRL	5000 GAL	22	0	5	H-H
6070885A	BAY CITY	MI	76/07/15	GASOLINE	F. L.	0	0	3,360	MC306	7000 GAL	22	0	5	H-H
8060399A	BOONEVILLE	MO	78/05/22	GASOLINE	F. L.	0	0	11,000	TANK TRL	7500 GAL	22	0	5	H-H
7061452A	MURDOCK	MN	77/06/20	GASOLINE	F. L.	0	0	24,000	MC305	6575 GAL	2	22	5	H-H

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6070802A	TAZEWELL	VA	76/07/09	GASOLINE	F. L.	3	3	0	MC305	8000 GAL	22	0	6	H-H
7070024A	DENNARD	AR	77/06/15	GASOLINE	F. L.	0	0	40,000	TANK TRL	500 GAL	22	0	5	H-H
7070047A	DYSART	IA	75/12/06	GASOLINE	F. L.	0	0	8,000	TANK TRL	1500 GAL	22	0	5	H-H
6120574A	CLEAR LAKE	IA	76/11/26	GASOLINE	F. L.	0	0	5	MC305	10 GAL	2	22	5	H-H
8060422A	PEMBROKE	VA	78/05/24	GASOLINE	F. L.	0	0	15,000	MC306	6346 GAL	22	0	5	H-H
8051038A	CAMAS VALLEY	OR	78/05/07	GASOLINE	F. L.	0	0	15,000	MC306	3380 GAL	22	0	5	H-H
7070315A	CARTHAGE	MO	77/06/29	GASOLINE	F. L.	0	0	500	TANK TRL	700 GAL	22	0	5	H-H
7070399A	GOLDEN	CO	77/06/18	GASOLINE	F. L.	0	0	4,250	MC306	8500 GAL	22	0	5	H-H
7070486A	SWEET HOME	OR	77/07/06	GASOLINE	F. L.	0	0	1,125	MC306	2250 GAL	22	0	5	H-H
7070616A	DEER PARK	NY	77/07/01	GASOLINE	F. L.	0	0	25,000	MC306	4000 GAL	22	0	5	H-H
6120040A	MARCY	NY	76/11/22	GASOLINE	F. L.	0	0	250	MC303	197 GAL	22	0	5	H-H
6050913A	HUNTINGTON BH	CA	76/05/17	GASOLINE	F. L.	0	0	3,500	TANK TRL	4700 CAL	22	0	5	H-H
6100645A	WARM SPRINGS	OR	76/07/11	GASOLINE	F. L.	0	0	50,000	MC306	3000 GAL	2	22	5	H-H
7110505A	FORT MYERS	FL	77/07/09	GASOLINE	F. L.	0	0	1,898	MC306	3330 GAL	22	0	5	H-H
7100390A	LAS ANIMAS	CO	77/09/02	GASOLINE	F. L.	0	0	750	MC306	1500 GAL	22	0	5	H-H
7110442A	DE KALB	MS	77/11/01	GASOLINE	F. L.	0	0	2,282	MC306	3287 GAL	22	0	5	H-H
6070578A	BURKE	NY	76/07/06	GASOLINE	F. L.	0	0	2,500	MC306	2000 GAL	22	0	5	H-H
8020564A	WAYNE	MI	78/01/07	GASOLINE	F. L.	0	0	3,092	MC305	4382 GAL	22	0	5	H-H
7010365B	HALLELUJAH	NV	77/01/08	GASOLINE	F. L.	0	0	22,200	TANK TRL	9000 GAL	22	0	5	H-H
6050597A	ELKHART	KS	76/05/03	GASOLINE	F. L.	0	0	18,118	MC306	5013 GAL	22	0	5	H-H
7121035A	WINNEMUCCA	NV	77/12/07	GASOLINE	F. L.	0	0	0	MC306	4000 GAL	22	0	5	H-H
8030923A	SUMMIT	CO	78/03/11	GASOLINE	F. L.	0	0	43,000	MC306	8400 GAL	2	22	6	H-H
7010365A	HALLELUJAH	NV	77/01/08	GASOLINE	F. L.	0	0	22,300	TANK TRL	9000 GAL	22	0	5	H-H
6100645B	WARM SPRINGS	OR	76/07/11	GASOLINE	F. L.	0	0	0	MC306	3000 GAL	2	22	5	H-H
7020138A	S SIOUX CITY	NE	76/10/23	GASOLINE	F. L.	0	0	3,000	MC305	8400 GAL	2	22	5	H-H
7121033A	LONGVIEW	WA	77/11/30	GASOLINE	F. L.	0	0	5,000	MC306	4545 GAL	22	0	4	H-H
6070413A	ELK GROVE VLG	IL	76/04/06	GASOLINE	F. L.	0	0	15	MC306	25 GAL	22	0	5	H-H
8030650A	BRANDENBURG	KY	78/02/23	GASOLINE	F. L.	0	0	52	MC306	102 GAL	22	0	5	H-H
8030542A	COLUMBIA	SC	78/02/11	GASOLINE	F. L.	0	0	21,000	TANK TRL	8500 GAL	2	22	5	H-H
•7091536A	RAPID CITY	SD	77/08/25	GASOLINE	F. L.	0	0	2,470	MC305	4942 GAL	22	0	5	H-H
7070796A	HEBRON	MS	77/06/24	GASOLINE	F. L.	0	0	15,000	MC306	8150 GAL	22	0	6	H-H
7010315A	OMAHA	NE	77/01/04	GASOLINE	F. L.	0	0	10,000	TANK TRL	3000 GAL	22	0	5	H-H
6070157A	GALLUP	NM	76/06/12	GASOLINE	F. L.	0	0	4,000	MC306	8000 GAL	22	0	5	H-H
8060426A	ORFORDVILLE	NH	78/05/30	GASOLINE	F. L.	0	0	70,000	MC306	5000 GAL	22	0	5	H-H
6070084A	CUBA	NM	76/05/26	GASOLINE	F. L.	0	0	28,475	MC306	4000 GAL	22	0	5	H-H
7110387A	LOUISVILLE	KY	77/10/22	GASOLINE	F. L.	0	0	0	MC306	1770 GAL	22	0	5	H-H
6060268A	WHITESTONE QU	NY	76/05/30	GASOLINE	F. L.	1	0	30,000	MC306	1700 GAL	22	0	6	H-H
7070967A	N BEND	NE	77/07/01	GASOLINE	F. L.	0	0	500	TANK TRL	1000 GAL	22	0	5	H-H
7071009A	FLAGSTAFF	AZ	77/06/30	GASOLINE	F. L.	0	0	1,000	MC306	2550 GAL	22	0	5	H-H
7071009B	FLAGSTAFF	AZ	77/06/30	GASOLINE	F. L.	0	0	1,000	MC306	2550 GAL	22	0	5	H-H
8030590A	OXFORD	NC	78/03/09	GASOLINE	F. L.	0	0	500	MC306	466 GAL	22	0	5	H-H
7020242A	GARY	WV	77/01/24	GASOLINE	F. L.	0	0	750	MC306	1500 GAL	22	0	5	H-H
7071280A	SPARTANBURG	SC	77/07/12	GASOLINE	F. L.	2	0	78,850	MC306	8850 GAL	22	0	8	H-H
7071374A	TULSA	OK	77/06/20	GASOLINE	F. L.	0	0	10,000	MC306	9200 GAL	22	0	6	H-H
7071445A	GILLETT	WI	77/07/15	GASOLINE	F. L.	0	0	1,011	MC306	2023 GAL	22	0	5	H-H
8030177A	MIDDLESBORO	KY	78/02/19	GASOLINE	F. L.	0	0	75	TANK TRL	150 GAL	2	22	5	H-H
7071447A	ROBSTOWN	TX	77/07/02	GASOLINE	F. L.	0	0	51,000	MC306	8825 GAL	22	0	6	H-H
8060465A	BALTIMORE	MD	78/06/02	GASOLINE	F. L.	0	0	20,000	TANK TRL	4000 GAL	22	0	5	H-H
7071521A	ELIZABETHTOWN	KY	77/07/08	GASOLINE	F. L.	0	0	45	MC306	8000 GAL	22	0	8	H-H
7110275A	N MIAMI	FL	77/10/31	GASOLINE	F. L.	0	0	8,000	MC306	4500 GAL	22	0	5	H-H

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6060577A	PRINCETON	WV	76/06/09	GASOLINE	F. L.	0	1	35,000	MC305	8400 GAL	22	0	6	H-H
6100860A	OLD WESTBURY	NY	76/10/16	GASOLINE	F. L.	1	0	70,000	MC306	8600 GAL	22	0	6	H-H
6120782A	CLERMONT	IN	76/12/16	GASOLINE	F. L.	0	0	2,175	MC306	4350 GAL	22	0	5	H-H
7080300A	HONEA PATH	SC	77/07/18	GASOLINE	F. L.	0	0	3,000	TANK TRL	6000 GAL	22	0	5	H-H
6120552A	BELTON	MO	76/12/10	GASOLINE	F. L.	0	1	20,500	MC306	5150 GAL	2	22	6	H-H
•7080425A	LAUGHLIN	NV	77/01/22	GASOLINE	F. L.	0	2	15,000	MC305	4150 GAL	22	0	5	H-H
•7080425B	LAUGHLIN	NV	77/01/22	GASOLINE	F. L.	0	0	15,000	MC305	4150 GAL	22	0	5	H-H
7020142A	WOOD RIVER	IL	77/01/18	GASOLINE	F. L.	0	0	5	MC305	10 GAL	22	0	5	H-H
6060451A	CHARLEROI	PA	76/06/03	GASOLINE	F. L.	0	0	40,000	MC306	7000 GAL	22	0	6	H-H
7080532A	FARMINGTON	NM	77/08/01	GASOLINE	F. L.	0	0	500	MC306	448 GAL	22	0	5	H-H
7080582A	LOCKLAND	OH	77/07/25	GASOLINE	F. L.	0	0	0	MC306	25 GAL	22	0	5	H-H
6060458A	PHOENIX	NY	76/05/24	GASOLINE	F. L.	0	0	1,000	MC306	1984 GAL	22	0	5	H-H
6110099A	IOWA CITY	IA	76/10/23	GASOLINE	F. L.	0	0	50,000	MC305	8000 GAL	22	0	6	H-H
7080756A	RUTLAND	VT	77/08/05	GASOLINE	F. L.	0	0	0	TANK TRL	2000 GAL	22	0	5	H-H
6060912A	GERMANTOWN	WI	76/06/04	GASOLINE	F. L.	0	0	855	MC305	550 GAL	2	22	5	H-H
7081000A	MCMINNVILLE	TN	77/08/03	GASOLINE	F. L.	0	0	408	MC305	793 GAL	22	0	5	H-H
7081001A	NASHVILLE	TN	77/08/09	GASOLINE	F. L.	0	0	4,661	MC305	8886 GAL	22	0	2	H-H
7091436A	MOBILE	AL	77/09/17	GASOLINE	F. L.	0	0	1,197	TANK TRL	2422 GAL	22	0	5	H-H
8030566A	BARKER	NY	78/03/09	GASOLINE	F. L.	0	0	1,750	MC306	4000 GAL	2	22	5	H-H
7081314A	ALBANY	NY	77/08/13	GASOLINE	F. L.	0	0	35,000	TANK TRK	6400 GAL	2	22	5	H-H
7010143A	ST PAUL	MN	76/12/30	GASOLINE	F. L.	0	0	0	MC305	2700 GAL	2	22	5	H-H
7081470A	TRAVELERS RST	SC	77/08/16	GASOLINE	F. L.	0	0	300	MC306	900 GAL	2	22	5	H-H
6100249A	LUBBOCK	TX	76/09/17	GASOLINE	F. L.	0	0	2,605	TANK TRL	5210 GAL	22	0	5	H-H
7081575A	N CHARLESTON	SC	77/08/11	GASOLINE	F. L.	0	0	7,000	TANK TRL	2300 GAL	22	0	5	H-H
7081749A	TRUTH OR CONS	NM	77/08/14	GASOLINE	F. L.	0	0	4,300	TANK TRK	5600 GAL	22	0	5	H-H
6060837A	SARDINIA	OH	76/05/20	GASOLINE	F. L.	0	0	90	MC305	200 GAL	22	0	5	H-H
6060836A	LAKE ALFRED	FL	76/06/08	GASOLINE	F. L.	0	0	835	MC306	1671 GAL	22	0	5	H-H
6060835A	KISSIMMEE	FL	76/05/05	GASOLINE	F. L.	0	0	1,765	MC306	3530 GAL	22	0	5	H-H
•7090194A	RAPID CITY	SD	77/08/25	GASOLINE	F. L.	0	0	2,500	MC305	5000 GAL	22	0	5	H-H
6120664A	SUFFOLK	VA	76/12/18	GASOLINE	F. L.	0	1	33,500	MC306	8000 GAL	22	0	6	H-H
7110085A	MILTON	FL	77/10/21	GASOLINE	F. L.	0	0	350	MC300	6943 GAL	22	0	6	H-H
7020717A	NAMPA	ID	77/02/09	GASOLINE	F. L.	0	0	2,000	MC306	4151 GAL	22	0	5	H-H
7090542A	FLOMATON	AL	77/08/27	GASOLINE	F. L.	0	0	705	TANK TRL	2014 GAL	22	0	5	H-H
6120781A	IRWIN	PA	76/12/15	GASOLINE	F. L.	0	0	15	MC306	30 GAL	22	0	5	H-H
8100585A	STEVENS CITY	VA	78/10/04	GASOLINE	F. L.	1	0	0	TANK TRL	2500 GAL	2	22	5	H-H
8091479A	W DILLON	CO	78/09/07	GASOLINE	F. L.	0	0	55,000	MC306	7500 GAL	22	0	6	H-H
8070513A	MOULTRIE	GA	78/06/08	GASOLINE	F. L.	0	0	10,000	MC306	4800 GAL	22	0	5	H-H
8070555A	JAMESTOWN	TN	78/06/29	GASOLINE	F. L.	1	0	60,000	MC306	8000 GAL	22	0	8	H-H
8110506A	STRONG CITY	KS	78/11/02	GASOLINE	F. L.	0	0	1,600	MC301	3600 GAL	22	0	5	H-H
8070684A	SALT LAKE CY	UT	78/06/22	GASOLINE	F. L.	0	0	2,400	MC305	4628 GAL	22	0	5	H-H
8071096A	HARRISON	NJ	78/07/07	GASOLINE	F. L.	0	1	50,000	MC307	7500 GAL	22	0	6	H-H
8071148A	MEXICAN HAT	UT	78/07/12	GASOLINE	F. L.	0	0	45,000	MC306	6551 GAL	22	0	5	H-H
3070247A	PENSACOLA	FL	73/06/25	GASOLINE	F. L.	0	0	260	TANK TRK	0	2	0	5	H-H
8071464A	VICKSBURG	MS	78/07/18	GASOLINE	F. L.	0	0	2,000	TANK TRL	6700 GAL	22	0	5	H-H
8060074A	ROUND UP	MT	78/05/22	GASOLINE	F. L.	0	0	600	MC306	1500 GAL	22	0	5	H-H
8080296A	FENNVILLE	MI	78/07/28	GASOLINE	F. L.	0	0	5,000	TANK TRK	100 GAL	22	0	5	H-H
8080406A	ORR	MN	78/07/01	GASOLINE	F. L.	0	0	22,000	TANK TRL	4800 GAL	22	0	5	H-H
8080412A	OREGON	OH	78/07/07	GASOLINE	F. L.	0	0	75,000	MC306	4500 GAL	22	0	6	H-H
8100346A	NORTON	KS	78/09/27	GASOLINE	F. L.	0	0	1,366	TANK TRL	5466 GAL	22	0	5	H-H
8100579A	WINDSOR	IL	78/09/14	GASOLINE	F. L.	0	0	0	TANK TRL	400 GAL	22	0	5	H-H

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REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
8110819A	W WADSWORTH	NV	78/11/03	GASOLINE	F. L.	0	1	5,313	TANK TRL	7134 GAL	22	0	5	H-H
8070221A	PINSON	AL	78/01/31	GASOLINE	F. L.	0	0	10,000	MC306	1480 GAL	22	0	5	H-H
8111041A	MOUNT VERNON	TX	78/10/31	GASOLINE	F. L.	0	0	4,104	TANK TRL	8310 GAL	22	0	5	H-H
8111106A	WICHITA	KS	78/11/06	GASOLINE	F. L.	0	0	15,000	TANK TRL	4000 GAL	22	0	5	H-H
8101347A	TENNYSEN	WI	78/09/26	GASOLINE	F. L.	0	0	40,000	MC305	8300 GAL	22	0	6	H-H
8070158A	WABASH	IN	78/05/25	GASOLINE	F. L.	0	0	3,150	MC306	7800 GAL	22	0	6	H-H
8101320A	COUSHATTA	LA	78/10/02	GASOLINE	F. L.	0	0	221	TANK TRL	4424 GAL	22	0	5	H-H
8100198A	WINSLOW	AZ	78/09/22	GASOLINE	F. L.	0	0	4,000	MC301	3250 GAL	2	22	5	H-H
8120045A	SELMA	NC	78/11/23	GASOLINE	F. L.	0	0	580	MC306	2750 GAL	17	22	5	H-H
8081169A	ROSELAND	NJ	78/08/16	GASOLINE	F. L.	0	0	1,200	MC306	2000 GAL	22	0	5	H-H
3110408A	RIB MOUNTAIN	WI	73/11/15	GASOLINE	F. L.	1	0	35,000	MC305	0	17	0	6	H-H
8110480A	COLUMBIA	SC	78/10/26	GASOLINE	F. L.	0	1	25,000	MC306	8550 GAL	22	0	6	H-H
8110161A	COLUMBUS	MS	78/09/18	GASOLINE	F. L.	0	0	1,753	MC306	3965 GAL	22	0	5	H-H
8061582A	INOLA	OK	78/06/12	GASOLINE	F. L.	0	0	5,619	TANK TRK	6238 GAL	22	0	5	H-H
8090651A	SHEEP SPRINGS	NM	78/09/06	GASOLINE	F. L.	1	0	4,500	MC306	9000 GAL	22	0	5	H-H
8120324A	DALLAS	TX	78/11/21	GASOLINE	F. L.	0	0	3,892	MC305	371 GAL	22	0	5	H-H
8081592A	MONTEREY	CA	78/08/24	GASOLINE	F. L.	0	0	0	TANK TRK	7 GAL	22	0	5	H-H
8120343A	TACOMA	WA	78/11/22	GASOLINE	F. L.	0	0	4,000	MC306	648 GAL	22	0	5	H-H
8120346A	SKAGGS ISLAND	CA	78/11/22	GASOLINE	F. L.	0	0	0	MC306	2000 GAL	22	0	5	H-H
8120357A	SPARTANBURG	SC	78/11/10	GASOLINE	F. L.	0	0	3,000	TANK TRL	6000 GAL	22	0	5	H-H
8110220A	S BAY	FL	78/10/02	GASOLINE	F. L.	0	1	70,000	MC306	8000 GAL	22	0	8	H-H
8120427A	MIDDLEHOPE	NY	78/12/01	GASOLINE	F. L.	0	0	75	MC306	125 GAL	22	0	5	H-H
8100967A	YAZOO	MS	78/09/29	GASOLINE	F. L.	0	0	23,000	MC300	7900 GAL	22	0	6	H-H
8100107A	JOPLIN	MO	78/09/02	GASOLINE	F. L.	0	0	1,192	TANK TRL	2385 GAL	22	0	5	H-H
8081780A	HARDIN	KY	78/08/11	GASOLINE	F. L.	0	0	3,000	TANK TRL	2625 GAL	22	0	5	H-H
8061462A	BRIDGEWATER	NJ	78/06/09	GASOLINE	F. L.	0	2	4,497	MC306	8500 GAL	22	0	6	H-H
8120971A	SARGENTS	CO	78/12/11	GASOLINE	F. L.	0	0	2,000	MC306	4400 GAL	2	22	5	H-H
8070224A	MONTGOMERY	AL	78/05/30	GASOLINE	F. L.	0	0	23,000	MC306	6200 GAL	22	0	5	H-H
3070498A	LEBANON	NH	73/07/06	GASOLINE	F. L.	0	0	11,500	MC306	0	11	0	5	H-P
5020322A	WINCHESTER	KY	73/10/03	GASOLINE	F. L.	0	0	25,000	MC306	0	2	17	5	H-P
5050578A	CLARKSBURG	WV	75/05/02	GASOLINE	F. L.	0	0	153	MC306	0	17	0	5	H-P
3070272A	MAR ESTER	FL	73/06/25	GASOLINE	F. L.	0	0	300	MC306	0	17	0	5	H-P
4010324A	HYPERION	CA	74/01/08	GASOLINE	F. L.	1	0	40,000	MC306	0	2	0	6	H-P
7080424A	SPARTA	WI	77/07/08	GASOLINE	F. L.	0	0	2,250	TANK TRL	4500 GAL	22	0	5	H-P
7110216A	MEADVILLE	MO	77/10/27	GASOLINE	F. L.	0	0	300	TANK TRL	488 GAL	22	0	5	H-P
7040596A	HYDE PARK	NY	77/02/17	GASOLINE	F. L.	0	0	20,000	TANK TRK	3500 GAL	22	0	1	H-P
7020079A	EDEN	NC	77/01/22	GASOLINE	F. L.	0	0	0	TANK CAR	8000 GAL	22	0	4	H-P
4020041A	BOZEMAN	MT	73/12/21	GASOLINE	F. L.	0	0	40,000	MC306	0	17	0	6	H-P
4020063A	RENO	NV	74/01/19	GASOLINE	F. L.	0	0	900	TANK TRL	0	11	0	5	H-P
6090627A	NEWPORT	PA	76/08/31	GASOLINE	F. L.	0	0	762	MC306	1500 GAL	22	0	5	H-P
7020029B	UNITY	OR	77/01/24	GASOLINE	F. L.	0	0	100	MC306	200 GAL	22	0	5	H-P
7020029A	UNITY	OR	77/01/24	GASOLINE	F. L.	0	0	0	MC306	2030 GAL	2	22	5	H-P
7030284A	WOODBURY	CT	77/02/14	GASOLINE	F. L.	0	0	35,000	TANK TRL	1500 GAL	22	0	5	H-P
4020341A	HONOLULU	HI	74/02/15	GASOLINE	F. L.	0	0	100	TANK TRK	0	2	0	5	H-P
4020342A	YAKIMA	WA	74/02/10	GASOLINE	F. L.	0	0	3,000	TANK TRL	0	17	0	5	H-P
4030051A	LAMPASAS	TX	74/02/22	GASOLINE	F. L.	0	0	4,000	TANK TRL	0	2	0	5	H-P
4030174A	BUCKEYE	AZ	74/02/24	GASOLINE	F. L.	0	0	5,000	TANK TRL	0	17	0	5	H-P
4030301A	NASHVILLE	TN	74/03/11	GASOLINE	F. L.	0	0	223	TANK TRK	0	10	0	5	H-P
4030302A	LOMPOC CITY	CA	74/03/08	GASOLINE	F. L.	0	0	100	TANK TRK	0	14	17	5	H-P
4030367A	LINCOLN	MT	74/03/05	GASOLINE	F. L.	0	0	15	MC306	0	17	0	5	H-P

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REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
4030370A	NEWARK	NJ	74/03/09	GASOLINE	F. L.	0	0	30,000	TANK TRL	0	2	0	5	H-P
6060745A	WESTERNVILLE	NY	76/05/20	GASOLINE	F. L.	0	0	500	MC306	15 GAL	22	0	5	H-P
7020467A	PENDLETON	OR	76/04/16	GASOLINE	F. L.	0	0	1,500	TANK TRL	3200 GAL	2	22	5	H-P
7010672B	WOODBURN	OR	77/01/15	GASOLINE	F. L.	0	0	0	TANK TRL	4500 GAL	22	0	6	H-P
4010414A	CENTERVILLE	TN	74/01/22	GASOLINE	F. L.	0	0	7,402	TANK TRL	0	17	0	5	H-P
4040309A	SAYREVILLE	NJ	74/04/05	GASOLINE	F. L.	0	0	0	TANK TRL	0	2	17	5	H-P
4040310A	FAIRLAWN	OH	74/04/01	GASOLINE	F. L.	0	0	13,468	TANK TRL	0	2	17	5	H-P
6110721A	MURFREESBORO	TN	76/10/04	GASOLINE	F. L.	0	0	506	TANK TRK	1012 GAL	22	0	5	H-P
4040443A	SONORA	CA	74/03/30	GASOLINE	F. L.	0	0	5,000	MC306	0	2	17	5	H-P
4040449A	PILOT KNOB	MO	74/04/16	GASOLINE	F. L.	0	0	1,515	TANK TRL	0	17	0	5	H-P
4010393A	BALTIMORE	MD	74/01/18	GASOLINE	F. L.	0	0	21,000	TANK TRL	0	2	17	5	H-P
7010672A	WOODBURN	OR	77/01/15	GASOLINE	F. L.	0	0	80,000	TANK TRK	4500 GAL	22	0	6	H-P
6120309A	AVILA BEACH	CA	76/09/10	GASOLINE	F. L.	0	0	5,500	TANK TRL	4700 GAL	22	0	5	H-P
7020773A	HESPERIA	MI	77/02/25	GASOLINE	F. L.	0	0	1,000	TANK TRL	1000 GAL	22	0	5	H-P
7030872A	MENDENHALL	MS	77/03/11	GASOLINE	F. L.	0	0	720	MC306	1500 GAL	22	0	5	H-P
6091050A	JOHNSTON	RI	76/09/14	GASOLINE	F. L.	0	0	0	MC306	2000 GAL	22	0	6	H-P
4050478A	CONYERS	GA	74/05/17	GASOLINE	F. L.	0	0	11,000	TANK TRK	0	17	0	5	H-P
4050645A	VAN BUREN	MI	74/05/20	GASOLINE	F. L.	0	0	85,000	TANK TRL	0	17	0	6	H-P
7020579A	MADISON	WV	77/02/13	GASOLINE	F. L.	0	0	100	TANK TRL	55 GAL	22	0	5	H-P
6080451A	LOUISVILLE	KY	76/07/27	GASOLINE	F. L.	0	0	10,000	MC306	6100 GAL	22	0	5	H-P
4060336A	W LONG BRANCH	NJ	74/05/20	GASOLINE	F. L.	0	0	86	TANK TRL	0	17	0	5	H-P
7020776B	DETROIT	MI	77/02/11	GASOLINE	F. L.	0	0	53,959	TANK TRL	4130 GAL	22	0	6	H-P
4060343A	LA PUENTE	CA	74/06/05	GASOLINE	F. L.	0	0	2,500	TANK TRL	0	17	0	5	H-P
4060496A	MEMPHIS	TN	74/06/10	GASOLINE	F. L.	0	0	2	TANK TRL	0	17	0	5	H-P
4060693A	BOSTONHTS VLG	OH	74/06/14	GASOLINE	F. L.	0	0	1,910	MC306	0	2	17	5	H-P
4060694A	HILLSBORO	OR	74/05/25	GASOLINE	F. L.	0	0	25,000	MC306	0	2	17	5	H-P
4070043A	GOLDEN	CO	74/06/10	GASOLINE	F. L.	0	0	20,000	MC306	0	2	17	6	H-P
4070158A	LOS ANGELES	CA	74/06/24	GASOLINE	F. L.	0	0	226	TANK TRL	0	17	0	5	H-P
4070446A	WESTFIELD	NY	74/07/10	GASOLINE	F. L.	0	0	0	TANK TRL	0	2	17	5	H-P
4070458A	OSTERHOUT	PA	74/07/03	GASOLINE	F. L.	0	0	4,000	TANK TRL	0	11	17	5	H-P
4070459A	CHEEKTOWAGA	NY	74/06/27	GASOLINE	F. L.	0	0	100	TANK TRL	0	17	0	5	H-P
6090042A	FORT MORGAN	CO	76/07/07	GASOLINE	F. L.	0	0	45,000	MC306	2596 GAL	2	22	5	H-P
6080677A	DUGDALE	MN	76/07/29	GASOLINE	F. L.	0	0	73,859	MC306	8975 GAL	22	0	6	H-P
6080367A	ST CHARLES	MO	76/08/04	GASOLINE	F. L.	0	0	100,000	MC306	7300 GAL	19	0	6	H-P
4080229A	GREENBANK	WA	74/07/26	GASOLINE	F. L.	0	0	3,500	TANK TRK	0	2	17	5	H-P
4080409A	VALLEY VIEW	CA	74/07/24	GASOLINE	F. L.	0	0	5,694	TANK TRL	0	2	17	5	H-P
4080641A	WILLOWBROOK	IL	74/08/07	GASOLINE	F. L.	0	0	3,167	TANK TRL	0	17	0	5	H-P
8070111A	PRICE CANYON	UT	78/06/30	GASOLINE	F. L.	0	0	40,000	TANK TRL	6800 GAL	22	0	5	H-P
4090043A	DARIEN	CT	74/08/20	GASOLINE	F. L.	0	0	20,000	TANK TRL	0	2	17	5	H-P
6080361A	RIDGEFIELD	NJ	76/07/28	GASOLINE	F. L.	0	0	21,800	MC306	8850 GAL	2	22	5	H-P
•4090509A	TROY	ID	74/09/06	GASOLINE	F. L.	0	0	34,000	MC306	0	2	17	6	H-P
•4090509B	TROY	ID	74/09/06	GASOLINE	F. L.	0	0	0	MC306	0	2	17	6	H-P
4090536A	BURLEY	ID	74/08/22	GASOLINE	F. L.	0	0	1,200	MC306	0	2	17	5	H-P
4010299A	NAMPARD	ID	73/12/29	GASOLINE	F. L.	0	0	3,686	TANK TRL	0	2	0	5	H-P
4090627A	FORTVILLE	IN	74/09/04	GASOLINE	F. L.	0	0	15,000	TANK TRL	0	17	0	5	H-P
7030175A	TRINITY	TX	77/01/17	GASOLINE	F. L.	0	0	20,000	TANK TRK	20000 GAL	22	0	5	H-P
4100591A	NASHUA	MT	74/10/15	GASOLINE	F. L.	0	0	0	MC305	0	11	17	5	H-P
4100842A	CENTRAL ISLIP	NY	74/10/12	GASOLINE	F. L.	0	0	680	MC306	0	2	17	5	H-P
4110119A	MACON	GA	74/10/25	GASOLINE	F. L.	0	0	22,500	TANK TRL	0	17	0	6	H-P
7020466A	CHARLESTON	SC	76/02/16	GASOLINE	F. L.	0	0	4,512	TANK TRL	8000 GAL	2	22	5	H-P

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4010298A	SHIPROCK	NM	74/01/15	GASOLINE	F. L.	0	1	14,795	TANK TRK	0		2	17	6	H-P
8120425A	TRUCKEE	CA	78/11/28	GASOLINE	F. L.	0	0	1,400	TANK TRL	2730	GAL	22	0	5	H-P
4110250A	PITTSBURG	CA	74/10/22	GASOLINE	F. L.	0	0	180	TANK TRK	0		2	0	5	H-P
4110329A	FALLS CHURCH	VA	74/10/07	GASOLINE	F. L.	0	0	32,000	TANK TRK	0		8	17	5	H-P
4010275A	LAS VEGAS	NM	73/12/10	GASOLINE	F. L.	0	0	147	TANK TRL	0		17	0	5	H-P
4110398A	WESTON	MA	74/10/19	GASOLINE	F. L.	0	0	15,000	MC305	0		17	0	5	H-P
4010203A	ONEIDA	TN	73/12/29	GASOLINE	F. L.	0	0	1,400	TANK TRL	0		17	0	5	H-P
4120077A	MOUNTAINVIEW	WY	74/11/20	GASOLINE	F. L.	0	0	15,000	MC305	0		17	0	5	H-P
4120196A	HARRINGTON	DE	74/11/20	GASOLINE	F. L.	0	1	8,000	TANK TRK	0		17	0	6	H-P
4120387A	COCKEYSVILLE	MD	74/12/03	GASOLINE	F. L.	0	0	4,000	TANK TRK	0		2	17	6	H-P
3070411A	ALLENTOWN	PA	73/05/26	GASOLINE	F. L.	0	0	12,000	TANK TRL	0		11	0	5	H-P
5010023A	WESTMORELAND	CA	74/12/04	GASOLINE	F. L.	0	0	30,000	TANK TRK	0		2	0	5	H-P
5010119A	DURHAM	NC	74/12/24	GASOLINE	F. L.	0	0	8,000	TANK TRL	0		17	0	5	H-P
5010178A	NORTHUMBLND	PA	75/01/02	GASOLINE	F. L.	0	0	100	TANK TRL	0		11	17	5	H-P
7010516A	CARTHAGE	MO	77/01/05	GASOLINE	F. L.	0	0	0	TANK TRL	2500	GAL	22	0	5	H-P
6090168B	SAN JOSE	CA	76/08/23	GASOLINE	F. L.	0	0	0	TANK TRL	5000	GAL	2	22	5	H-P
3120341A	HYSHAM	MT	73/12/21	GASOLINE	F. L.	0	0	15	MC302	0		2	0	5	H-P
5010728A	CHESTER	NJ	75/01/10	GASOLINE	F. L.	0	0	30,000	MC305	0		2	17	5	H-P
5010735A	BERLIN	CT	74/11/13	GASOLINE	F. L.	0	0	25,000	TANK TRL	0		2	17	5	H-P
7030055A	WILSON	NC	77/02/18	GASOLINE	F. L.	0	0	600	TANK TRL	1080	GAL	2	22	5	H-P
6050914A	SAN DIEGO	CA	76/05/09	GASOLINE	F. L.	0	0	60	TANK TRK	20	GAL	17	0	5	H-P
6110056A	EXETER	RI	76/10/15	GASOLINE	F. L.	1	0	60,000	TANK TRL	6600	GAL	22	0	6	H-P
5020254A	WINDHAM	NH	75/01/18	GASOLINE	F. L.	0	0	35,000	TANK TRL	0		2	17	5	H-P
6061111A	LAS ANIMAS	CO	76/06/20	GASOLINE	F. L.	0	0	15,000	MC305	1600	GAL	2	22	5	H-P
3120339A	BIG FLATS	NY	73/12/27	GASOLINE	F. L.	0	0	3,700	MC305	0		2	0	5	H-P
7030053A	ELM CREEK	NE	74/07/08	GASOLINE	F. L.	1	4	50,000	MC306	8355	GAL	22	0	6	H-P
5020443A	COMMACK	NY	74/11/12	GASOLINE	F. L.	0	0	10,000	TANK TRL	0		2	17	5	H-P
7020646A	BIRCH RUN	MI	75/01/23	GASOLINE	F. L.	0	0	14,000	TANK TRL	10442	GAL	22	0	5	H-P
5020507A	SCOBEY	MT	75/02/04	GASOLINE	F. L.	0	0	18,000	MC302	0		17	0	5	H-P
5020577A	MIDDLEBORO	MA	75/02/20	GASOLINE	F. L.	0	0	120	MC306	0		17	0	5	H-P
3120250A	VALLEJO	CA	73/12/08	GASOLINE	F. L.	0	0	15,000	TANK TRL	0		2	0	5	H-P
7040816A	SAN DIEGO	CA	75/06/14	GASOLINE	F. L.	0	0	8,800	TANK TRL	2700	GAL	2	22	5	H-P
5030143A	SHIPROCK	NM	74/08/07	GASOLINE	F. L.	0	0	60,000	TANK TRL	0		17	0	6	H-P
5030268A	READING	PA	75/03/04	GASOLINE	F. L.	0	0	240	TANK TRK	0		17	0	1	H-P
5030279A	ST PETERSBURG	FL	75/02/22	GASOLINE	F. L.	0	0	48,000	MC306	0		17	0	5	H-P
6110271A	NASHVILLE	IN	76/10/21	GASOLINE	F. L.	1	0	75,000	TANK TRL	7000	GAL	22	0	8	H-P
5030424A	OOLTEWAH	TN	75/03/03	GASOLINE	F. L.	0	0	42	TANK TRK	0		17	0	5	H-P
6050846A	GOLDSBORO	NC	76/05/20	GASOLINE	F. L.	0	0	5,750	TANK TRK	6500	GAL	22	0	5	H-P
7010328A	KNOXVILLE	TN	77/01/04	GASOLINE	F. L.	0	0	0	TANK TRK	8400	GAL	22	0	6	H-P
5030577A	BRISTOL	VT	75/03/14	GASOLINE	F. L.	0	0	340	MC306	0		17	0	5	H-P
7020733A	WHIPPLE	OH	77/02/14	GASOLINE	F. L.	0	0	0	MC306	161	GAL	22	0	5	H-P
5030687A	LAKE BUTLER	FL	75/03/14	GASOLINE	F. L.	0	0	17,651	MC306	0		17	0	5	H-P
3120077A	BOWLING GREEN	KY	73/12/01	GASOLINE	F. L.	0	0	10,000	MC306	0		17	0	5	H-P
5030777A	GETTYSBURG	PA	75/03/19	GASOLINE	F. L.	0	0	60	MC306	0		17	0	5	H-P
5030789A	COMMERCE	GA	75/03/26	GASOLINE	F. L.	0	0	1,500	TANK TRK	0		17	0	5	H-P
5040048A	HORSESHOE BND	ID	75/03/07	GASOLINE	F. L.	0	0	10,000	TANK TRK	0		17	0	5	H-P
7040211A	CHARLOTTE	NC	77/03/29	GASOLINE	F. L.	0	0	5,000	MC306	8150	GAL	22	0	5	H-P
6070751A	MAUPIN	OR	76/07/17	GASOLINE	F. L.	0	0	4,100	TANK TRL	1729	GAL	22	0	5	H-P
7030893A	TUXEDO	MD	74/04/18	GASOLINE	F. L.	0	0	6,200	TANK TRL	8500	GAL	2	22	5	H-P
5040117A	ALBUQUERQUE	NM	75/03/26	GASOLINE	F. L.	0	0	23	TANK TRL	0		17	0	5	H-P

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REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
7020468A	PORTLAND	OR	76/06/21	GASOLINE	F. L.	0	0	3,000	TANK TRK	2231 GAL	22	0	5	H-P
3110343A	SALINAS	CA	73/11/06	GASOLINE	F. L.	0	0	50,000	MC306	0	2	0	6	H-P
5040282A	CARSON	CA	75/03/18	GASOLINE	F. L.	0	0	20,000	TANK TRL	0	17	0	5	H-P
5040546A	CORRY	PA	75/04/15	GASOLINE	F. L.	0	0	47,000	TANK TRL	0	17	0	5	H-P
5040603A	PHOENIX	AZ	75/04/11	GASOLINE	F. L.	0	0	25,000	TANK TRK	0	17	0	5	H-P
5040698A	TUPELO	MS	75/04/16	GASOLINE	F. L.	1	6	43,000	TANK TRL	0	2	0	6	H-P
5040762A	CHICAGO	IL	75/03/17	GASOLINE	F. L.	0	0	0	TANK TRL	0	2	0	5	H-P
5050080A	IRVING	TX	75/04/24	GASOLINE	F. L.	0	0	8,000	MC306	0	2	17	5	H-P
5050413A	PHILADELPHIA	PA	75/04/26	GASOLINE	F. L.	0	0	0	MC306	0	17	0	6	H-P
7030052A	AKERSVILLE	KY	77/02/11	GASOLINE	F. L.	1	0	3,000	TANK TRK	1500 GAL	22	0	2	H-P
7010209A	E SLIDELL	LA	77/01/01	GASOLINE	F. L.	0	0	0	TANK TRK	8000 GAL	22	0	5	H-P
5050564A	NEWTON	MA	75/05/03	GASOLINE	F. L.	0	0	45,000	MC306	0	2	0	5	H-P
5050630A	SPRINGFIELD	MO	75/05/13	GASOLINE	F. L.	0	0	15,000	TANK TRL	0	17	0	5	H-P
5050751A	SKYKOMISH	WA	75/05/13	GASOLINE	F. L.	0	0	8,000	TANK TRL	0	2	17	5	H-P
5050771A	BELLFLOWER	CA	75/05/08	GASOLINE	F. L.	0	0	10,000	TANK TRL	0	17	0	5	H-P
5050820A	SAVANNAH	GA	75/05/09	GASOLINE	F. L.	0	0	60,000	MC306	0	2	17	5	H-P
5060010A	STOCKLAND	IL	75/05/16	GASOLINE	F. L.	0	0	52,500	MC306	0	17	0	5	H-P
7010189A	CORAM	MT	76/12/17	GASOLINE	F. L.	0	0	0	TANK TRL	6300 GAL	22	0	5	H-P
5060042A	ABILENE	TX	75/05/24	GASOLINE	F. L.	0	0	70	MC306	0	17	0	5	H-P
7020146A	LONG BEACH	CA	77/01/29	GASOLINE	F. L.	0	0	57,000	TANK TRL	2000 GAL	22	0	6	H-P
5060061A	MOUNTAIN VIEW	MO	75/05/28	GASOLINE	F. L.	0	0	6,500	MC305	0	17	0	5	H-P
5060422A	PIKESVILLE	MD	75/06/05	GASOLINE	F. L.	1	0	36,000	TANK TRL	0	2	0	6	H-P
6050839A	MOSCOW	OH	76/05/11	GASOLINE	F. L.	0	0	3,000	MC306	5330 GAL	22	0	5	H-P
5060621A	GLENDALE	CA	75/06/04	GASOLINE	F. L.	0	0	2,536	MC306	0	17	0	5	H-P
5060707A	PITTSBURGH	PA	75/06/14	GASOLINE	F. L.	0	0	10	TANK TRL	0	17	0	5	H-P
5060899A	LITTLE FERRY	NJ	75/06/17	GASOLINE	F. L.	0	0	40,000	TANK TRL	0	10	17	5	H-P
5061022A	LAST CHANCE	CO	75/06/23	GASOLINE	F. L.	0	0	0	MC305	0	17	0	5	H-P
7020266A	SMITH	PA	77/02/03	GASOLINE	F. L.	0	0	825	MC306	2035 GAL	22	0	5	H-P
5070055A	VISALIA	CA	75/06/19	GASOLINE	F. L.	0	0	36,148	TANK TRL	0	2	17	5	H-P
6091099A	PASCAGOULA	MS	76/09/21	GASOLINE	F. L.	0	0	2,600	TANK TRK	1500 GAL	20	0	5	H-P
6080900A	RIRIE	ID	76/08/11	GASOLINE	F. L.	0	1	650	MC306	314 GAL	22	0	5	H-P
5070195A	W UNITY	OH	75/06/16	GASOLINE	F. L.	0	0	8,500	TANK TRL	0	17	0	5	H-P
5070758A	HUNDRED	WV	75/07/09	GASOLINE	F. L.	0	0	2,152	TANK TRL	0	17	0	5	H-P
3070434A	LAVONIA	GA	73/07/05	GASOLINE	F. L.	0	0	1,350	TANK TRL	0	17	0	5	H-P
7020459A	GOVT CAMP	OR	75/01/04	GASOLINE	F. L.	0	0	150	TANK TRL	300 GAL	22	0	5	H-P
7031040A	OBLONG	IL	77/03/11	GASOLINE	F. L.	0	0	8,000	TANK TRL	300 GAL	22	0	5	H-P
7020933A	CARLOS	TX	77/02/03	GASOLINE	F. L.	0	0	1,715	TANK TRK	400 GAL	22	0	5	H-P
•5080155A	BAKERSFIELD	CA	75/07/27	GASOLINE	F. L.	0	1	75,000	TANK TRK	0	7	0	6	H-P
•5080155B	BAKERSFIELD	CA	75/07/27	GASOLINE	F. L.	0	0	0	TANK TRL	0	2	0	6	H-P
6090168A	SAN JOSE	CA	76/08/23	GASOLINE	F. L.	0	0	50,000	TANK TRK	4375 GAL	2	22	5	H-P
7020723A	ROMNEY	MI	77/02/12	GASOLINE	F. L.	0	0	1,600	TANK TRL	3500 GAL	2	22	5	H-P
5080920A	NORWOOD	CO	75/08/18	GASOLINE	F. L.	0	0	20,800	TANK TRL	0	2	17	5	H-P
7020901A	PITTSVIEW	AL	77/02/17	GASOLINE	F. L.	0	0	24,000	TANK TRK	7375 GAL	2	22	5	H-P
5080985A	HAUPPAUGE	NY	75/08/08	GASOLINE	F. L.	1	0	85,500	MC305	0	2	17	6	H-P
5080991A	BRIGHTON	CO	75/08/20	GASOLINE	F. L.	0	0	2,000	MC306	0	2	17	5	H-P
6120465A	HANOVER PARK	IL	76/12/06	GASOLINE	F. L.	0	0	0	MC306	4000 GAL	22	0	5	H-P
5090347A	HONOLULU	HI	75/08/28	GASOLINE	F. L.	0	0	10,900	TANK TRL	0	2	17	5	H-P
•5090455A	HEYBURN	ID	75/09/05	GASOLINE	F. L.	0	0	20,000	TANK TRK	0	17	0	5	H-P
•5090455B	HEYBURN	ID	75/09/05	GASOLINE	F. L.	0	0	0	MC306	0	17	0	5	H-P
5090556A	GILLETTE	WY	75/09/06	GASOLINE	F. L.	0	0	55,000	MC306	0	17	0	5	H-P

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3110163A	BILLINGS	MT	73/10/30	GASOLINE	F. L.	0	0	11,500	TANK TRL	0	17	0	5	H-P
3110136A	SEATTLE	WA	73/10/31	GASOLINE	F. L.	0	0	15,000	TANK TRL	0	17	0	5	H-P
6050712A	CLENDENIN	WV	76/05/13	GASOLINE	F. L.	0	0	119	TANK TRK	75 GAL	22	0	5	H-P
3100412A	HOMESTEAD	FL	73/10/10	GASOLINE	F. L.	1	0	41,900	TANK TRL	0	17	0	6	H-P
7020776A	DETROIT	MI	77/02/11	GASOLINE	F. L.	0	0	53,960	TANK TRK	4130 GAL	22	0	6	H-P
5100751A	WELLINGTON	TX	75/10/08	GASOLINE	F. L.	0	0	5,000	MC306	0	17	0	5	H-P
7020790A	CULLMAN	AL	77/02/12	GASOLINE	F. L.	0	1	75,000	TANK TRL	8000 GAL	17	22	6	H-P
7020789A	DETROIT	MI	77/02/11	GASOLINE	F. L.	0	0	53,959	TANK TRL	4130 GAL	22	0	6	H-P
5110268A	OXON HILL	MD	75/10/29	GASOLINE	F. L.	1	0	60,000	MC306	0	17	0	5	H-P
5110564A	WRIGHT	MI	75/11/04	GASOLINE	F. L.	0	0	12,000	MC306	0	11	17	5	H-P
5110693A	STUART	FL	75/10/27	GASOLINE	F. L.	0	0	158	TANI TRL	0	2	0	5	H-P
5110847A	MANTI	UT	75/11/19	GASOLINE	F. L.	0	0	12,000	MC306	0	17	0	5	H-P
7020460A	S RICHMOND	VA	75/03/31	GASOLINE	F. L.	0	0	25	TANK TRL	15 GAL	22	0	5	H-P
5120170A	GRAND MOUND	WA	75/11/26	GASOLINE	F. L.	0	0	1,500	TANK TRK	0	17	0	5	H-P
5120176A	WIMAUMA	FL	75/11/25	GASOLINE	F. L.	0	0	1,900	TANK TRL	0	17	0	5	H-P
5120338A	SEATTLE	WA	75/12/04	GASOLINE	F. L.	0	0	330,000	MC306	0	17	0	6	H-P
•7031117A	MAGNA	UT	77/03/22	GASOLINE	F. L.	0	0	3,250	MC306	4500 GAL	22	0	5	H-P
5120364A	GLENWOOD	AR	75/11/16	GASOLINE	F. L.	0	0	40	TANK TRK	0	17	0	5	H-P
6070427A	LYNNFIELD	MA	76/06/19	GASOLINE	F. L.	0	0	4,700	MC306	2300 GAL	2	22	5	H-P
5120478A	GLENWOOD	AR	75/11/16	GASOLINE	F. L.	0	0	40	TANK TRK	0	17	0	5	H-P
7040228B	GUERNSEY	WY	77/03/31	GASOLINE	F. L.	0	0	4,000	MC305	2800 GAL	22	0	5	H-P
5120508A	SALISBURY	MD	75/12/02	GASOLINE	F. L.	0	0	18,000	TANK TRL	0	17	0	5	H-P
•7031117B	MAGNA	UT	77/03/22	GASOLINE	F. L.	0	0	3,250	MC306	4500 GAL	22	0	5	H-P
5120736A	HARTFORD	CT	75/12/13	GASOLINE	F. L.	0	0	0	TANK TRL	0	17	0	5	H-P
6010548A	ELLENSBURG	WA	76/01/11	GASOLINE	F. L.	0	0	15,000	MC306	3650 GAL	2	22	5	H-P
7020469A	BAKERSFIELD	CA	77/01/28	GASOLINE	F. L.	0	0	150,000	TANK TRK	8650 GAL	22	0	6	H-P
7031082A	BOULDER CITY	NV	77/03/17	GASOLINE	F. L.	1	2	75,000	MC306	9500 GAL	22	0	6	H-P
6010711A	FORT PAYNE	AL	76/01/19	GASOLINE	F. L.	0	0	3,900	TANK TRK	1500 GAL	22	0	5	H-P
7010078A	BELCHER	KY	76/12/16	GASOLINE	F. L.	0	0	0	TANK TRL	2300 GAL	22	0	5	H-P
3100177A	AUSTIN	TX	73/09/20	GASOLINE	F. L.	1	0	30,000	MC306	0	2	0	6	H-P
6100606A	TALLAHASSEE	FL	76/10/13	GASOLINE	F. L.	0	0	3,500	TANK TRL	8500 GAL	22	0	6	H-P
3070529A	HOLLY	MI	73/07/03	GASOLINE	F. L.	0	0	0	TANK TRL	0	17	0	5	H-P
7040589A	EL LAGO	TX	75/09/18	GASOLINE	F. L.	0	1	50,000	TANK TRL	0	22	0	6	H-P
3100039A	JACKSONVILLE	FL	73/08/06	GASOLINE	F. L.	0	0	11,052	TANK TRL	0	2	0	6	H-P
3090471A	BURLINGTON	WA	73/09/17	GASOLINE	F. L.	0	0	14,163	MC305	0	17	0	5	H-P
6020200B	BENTON CITY	WA	76/01/21	GASOLINE	F. L.	0	0	0	TANK TRK	18 GAL	22	0	5	H-P
6020257A	GRAPEVINE	AR	76/01/26	GASOLINE	F. L.	0	0	0	TANK TRK	0	22	0	1	H-P
6020319A	SPRINGS	OR	76/02/01	GASOLINE	F. L.	0	0	1,000	TANK TRK	2000 GAL	22	0	6	H-P
6020319B	SPRINGS	OR	76/02/01	GASOLINE	F. L.	0	0	24,000	MC306	4994 GAL	22	0	6	H-P
6020324A	MONTOUR	ID	76/01/30	GASOLINE	F. L.	0	0	250	TANK TRL	400 GAL	22	0	5	H-P
6020418A	GREEN RIVER	WY	76/02/09	GASOLINE	F. L.	0	0	1,500	TANK TRK	200 GAL	22	0	5	H-P
3090343A	SIBLEY	LA	73/08/29	GASOLINE	F. L.	0	0	300	MC306	0	17	0	5	H-P
6020538A	NORTHFORK	WV	76/01/13	GASOLINE	F. L.	0	0	5,000	MC306	2700 GAL	2	22	5	H-P
7020647A	LOCKE	NY	75/04/10	GASOLINE	F. L.	0	2	350	MC306	8500 GAL	2	22	6	H-P
3090314A	HOMER	IL	73/08/10	GASOLINE	F. L.	0	0	34	TANK TRL	0	17	0	5	H-P
.6020590Z	DEXTER	OR	76/01/09	GASOLINE	F. L.	0	0	3,900	TANK TRK	0	22	0	1	H-P
7040690A	HOUSTON	AK	77/03/29	GASOLINE	F. L.	0	0	47,500	TANK TRL	4623 GAL	22	0	5	H-P
7040817A	SANTA MARIA	CA	75/12/11	GASOLINE	F. L.	0	0	2,500	TANK TRL	50 GAL	1	1	5	H-P
6020782A	W COLUMBIA	TX	76/02/12	GASOLINE	F. L.	0	1	60,000	MC306	7953 GAL	22	0	2	H-P
3090121A	CUSTER	SD	73/09/05	GASOLINE	F. L.	0	0	0	TANK TRL	0	11	0	5	H-P

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7010022A	ST PAUL	MN	76/12/18	GASOLINE	F. L.	2	0	100,000	TANK TRL	8000 GAL	22	0	6	H-P
6030218A	FT LAUDERDALE	FL	76/02/18	GASOLINE	F. L.	0	0	2,000	TANK TRL	4000 GAL	2	22	5	H-P
6070394A	YPSILANTI	MI	76/07/03	GASOLINE	F. L.	0	0	58,100	MC306	8120 GAL	2	22	6	H-P
3070047A	ACTON	MT	73/06/16	GASOLINE	F. L.	0	0	18,000	TANK TRL	0	17	0	5	H-P
3080521A	LINCOLNVILLE	KS	73/08/18	GASOLINE	F. L.	0	1	31,405	MC306	0	17	0	5	H-P
6030495A	FALLS CHURCH	VA	76/03/05	GASOLINE	F. L.	0	0	50	TANK TRK	85 GAL	22	0	5	H-P
6030550A	MANCHESTER	KY	76/03/05	GASOLINE	F. L.	0	0	235	TANK TRK	662 GAL	22	0	5	H-P
7040079A	OVERLAND PARK	KS	77/03/19	GASOLINE	F. L.	0	0	50,300	TANK TRL	6950 GAL	22	0	6	H-P
6100572A	DETROIT	MI	76/10/11	GASOLINE	F. L.	0	0	10,000	MC306	4750 GAL	22	0	5	H-P
6040317A	DETROIT	MI	76/03/12	GASOLINE	F. L.	0	1	70,000	LINR PLS	8600 GAL	22	0	6	H-P
3080278A	CRESCENT CITY	CA	73/08/07	GASOLINE	F. L.	0	0	1,460	TANK TRK	0	17	0	5	H-P
7020463A	LOAN	CA	75/10/12	GASOLINE	F. L.	0	0	4,100	TANK TRL	1900 GAL	22	0	5	H-P
6050680Z	SAUK CENTRE	MN	76/05/11	GASOLINE	F. L.	0	0	0	MC306	0 GAL	22	0	1	H-P
3070016A	EGNAR	CO	73/06/24	GASOLINE	F. L.	0	0	21,000	MC306	0	2	17	5	H-P
6050087A	WORCESTER	MA	76/04/16	GASOLINE	F. L.	0	1	0	MC306	4000 GAL	2	22	6	H-P
3080276A	AURORA	MO	73/08/08	GASOLINE	F. L.	0	0	560	MC305	0	2	0	5	H-P
6050301A	EDENTON	NC	76/04/21	GASOLINE	F. L.	0	0	40,000	TANK TRK	8300 GAL	22	0	6	H-P
6120762A	WARRENSBURG	MO	76/12/21	GASOLINE	F. L.	0	0	25	MC306	5 GAL	22	0	5	H-P
3080179A	SPRINGFIELD	MO	73/08/05	GASOLINE	F. L.	0	0	35,000	TANK TRK	0	17	0	5	H-P
8071376A	N LITTLE ROCK	AR	78/07/10	GASOLINE	F. L.	0	0	300	TANK TRK	500 GAL	22	0	5	H-P
7070326A	N CLOVERDALE	CA	77/06/30	GASOLINE	F. L.	0	0	1,800	TANK TRL	3600 GAL	22	0	5	H-P
8101335A	SYLVANIA	GA	78/10/11	GASOLINE	F. L.	1	0	22,000	TANK TRK	2900 GAL	22	0	6	H-P
8120771A	HOUSTON	TX	78/12/18	GASOLINE	F. L.	0	0	3,000	MC306	700 GAL	22	0	5	H-P
8110430A	LONDON	KY	78/10/21	GASOLINE	F. L.	0	0	0	TANK TRL	400 GAL	22	0	5	H-P
7110168A	HERMOSA	SD	77/10/28	GASOLINE	F. L.	0	0	0	MC306	4000 GAL	2	22	5	H-P
8101235A	FENTON	MI	78/10/10	GASOLINE	F. L.	0	0	200,000	TANK TRL	10000 GAL	22	0	6	H-P
8110764A	WATERFORD	MI	78/11/03	GASOLINE	F. L.	0	0	1,500	TANK TRK	3000 GAL	22	0	5	H-P
7070198A	GREENSBORO	NC	77/06/28	GASOLINE	F. L.	0	0	140	MC306	300 GAL	22	0	5	H-P
7061311A	NETTLETON	MS	77/06/15	GASOLINE	F. L.	0	0	40,000	TANK TRK	2000 GAL	22	0	5	H-P
7100145A	ALOFAU	AS	77/09/06	GASOLINE	F. L.	0	0	37	MC306	80 GAL	22	0	5	H-P
7090858A	HUNTSVILLE	TX	77/08/25	GASOLINE	F. L.	0	0	4,500	TANK TRL	6118 GAL	22	0	5	H-P
8120766A	GREENVILLE	KY	78/12/01	GASOLINE	F. L.	0	0	0	TANK TRK	395 GAL	22	0	5	H-P
7090205A	VALLEJO	CA	77/08/27	GASOLINE	F. L.	0	0	0	MC306	1800 GAL	22	0	5	H-P
7061293A	WINTERHAVEN	CA	77/06/06	GASOLINE	F. L.	0	0	45,000	TANK TRL	4650 GAL	22	0	6	H-P
7061093A	PHOENIX	AZ	77/06/05	GASOLINE	F. L.	0	0	84,000	TANK TRL	1000 GAL	22	0	8	H-P
7060797A	HOUSTON	AK	77/03/29	GASOLINE	F. L.	0	0	0	TANK TRL	4623 GAL	22	0	5	H-P
7120836A	SPRINGWATER	NY	77/12/01	GASOLINE	F. L.	0	0	55	MC306	100 GAL	15	22	5	H-P
7060663A	ANCHORAGE	AK	77/05/23	GASOLINE	F. L.	0	0	0	TANK TRL	4520 GAL	22	0	5	H-P
7121045A	MADISON HTS	MI	77/12/15	GASOLINE	F. L.	0	3	0	TANK TRL	11531 GAL	22	0	6	H-P
8010019A	WILLIAMSTOWN	MA	77/12/13	GASOLINE	F. L.	0	0	100	MC306	150 GAL	2	0	5	H-P
8010036A	MOUNT HEBRON	CA	77/12/17	GASOLINE	F. L.	0	0	5,000	MC305	1300 GAL	22	0	5	H-P
7090070A	HAMLET	IN	77/08/19	GASOLINE	F. L.	0	0	0	TANK TRK	200 GAL	22	0	5	H-P
7041062A	CHELYAN	WV	77/04/04	GASOLINE	F. L.	1	0	55,000	TANK TRL	9000 GAL	22	0	4	H-P
8071517B	GLENFIELD	NY	78/07/07	GASOLINE	F. L.	0	0	150	MC306	324 GAL	22	0	5	H-P
7050028A	CROMWELL	CT	75/12/31	GASOLINE	F. L.	0	0	2,400	TANK TRK	1300 GAL	2	22	5	H-P
8010244A	OVERLAND PARK	KS	77/12/29	GASOLINE	F. L.	0	0	0	MC306	1500 GAL	22	0	5	H-P
8120731A	WHITEHALL	MT	78/12/01	GASOLINE	F. L.	0	0	9,700	MC306	4200 GAL	2	22	5	H-P
8081374A	POUGHQUAG	NY	78/08/12	GASOLINE	F. L.	0	0	4,400	TANK'TRL	1900 GAL	2	22	5	H-P
8110149A	DRUMGOLD	PA	78/09/20	GASOLINE	F. L.	0	0	1,750	TANK TRK	1500 GAL	22	0	5	H-P
7091579A	HIGHLAND SPGS	VA	77/09/12	GASOLINE	F. L.	0	0	0	TANK TRL	6600 GAL	22	0	5	H-P

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8010534A	COLUMBIA	MO	77/12/28	GASOLINE	F. L.	0	0	11,000	MC306	528 GAL	22	0	5	H-P
7060428A	SOMERSET	KY	77/05/26	GASOLINE	F. L.	0	0	7,595	TANK TRL	8500 GAL	22	0	5	H-P
8010867A	SAN DIEGO	CA	78/01/06	GASOLINE	F. L.	0	0	0	TANK TRL	3000 GAL	22	0	5	H-P
7081796A	SOUTHFIELD	MI	77/08/18	GASOLINE	F. L.	1	0	100,629	MC306	6024 GAL	22	0	6	H-P
8011069A	COTTAGE GROVE	OR	78/01/02	GASOLINE	F. L.	0	0	5,500	TANK TRL	2268 GAL	22	0	5	H-P
7060233A	ABERDEEN	MD	75/06/12	GASOLINE	F. L.	0	0	0	TANK TRL	968 GAL	22	0	5	H-P
7060207A	NANUET	NY	77/05/26	GASOLINE	F. L.	0	0	0	TANK TRL	5 GAL	22	0	5	H-P
8081236A	GLENDALE	CA	78/08/16	GASOLINE	F. L.	0	0	6,000	MC306	1600 GAL	22	0	5	H-P
8061456A	MARIETTA	GA	78/06/09	GASOLINE	F. L.	0	0	25,000	TANK TRK	1500 GAL	22	0	5	H-P
8020023A	MURFREESBORO	TN	78/01/04	GASOLINE	F. L.	1	0	14,000	TANK TRK	500 GAL	2	22	6	H-P
7051393A	LEMON GROVE	CA	77/05/17	GASOLINE	F. L.	0	0	25,000	MC306	20 GAL	22	0	5	H-P
8100518A	PROVIDENCE	RI	78/09/27	GASOLINE	F. L.	0	0	2,650	TANK TRL	1200 GAL	2	22	5	H-P
8020090A	SHELBYVILLE	KY	78/01/09	GASOLINE	F. L.	0	0	350	TANK TRL	600 GAL	22	0	5	H-P
7051390B	EL MIRAGE	AZ	77/05/20	GASOLINE	F. L.	0	0	6,500	MC307	1890 GAL	22	0	5	H-P
7051390A	EL MIRAGE	AZ	77/05/20	GASOLINE	F. L.	0	0	6,500	MC307	1890 GAL	22	0	5	H-P
7070837A	DENVER	CO	77/06/25	GASOLINE	F. L.	0	1	0	TANK TRL	9500 GAL	22	0	6	H-P
8020330A	MELVINDALE	MI	78/02/02	GASOLINE	F. L.	0	0	4,126	MC306	300 GAL	22	0	5	H-P
8020375A	CONDON	OR	78/01/13	GASOLINE	F. L.	0	0	1,100	TANK TRK	1815 GAL	22	0	5	H-P
8111468A	OLYMPIA	WA	78/11/19	GASOLINE	F. L.	0	0	2,400	MC306	4800 GAL	22	0	5	H-P
8110446A	WESTOVER	PA	78/10/04	GASOLINE	F. L.	1	0	45,000	MC306	7900 GAL	22	0	6	H-P
8110460A	HAMILTON	OH	78/11/03	GASOLINE	F. L.	0	0	3,000	TANK TRL	800 GAL	22	0	5	H-P
7091475A	FOXBORO	MA	77/09/17	GASOLINE	F. L.	0	0	7,000	TANK TRL	1500 GAL	22	0	5	H-P
8020933A	W COMANCHE	TX	78/02/07	GASOLINE	F. L.	0	0	2,044	TANK TRL	687 GAL	22	0	5	H-P
8020942A	PHOENIX	AZ	77/10/18	GASOLINE	F. L.	0	0	25,000	MC305	3054 GAL	22	0	5	H-P
8030025A	NEW CASTLE	PA	78/02/17	GASOLINE	F. L.	0	0	10,000	TANK TRL	4565 GAL	2	22	5	H-P
8070921A	IMPERIAL CNTY	CA	78/03/30	GASOLINE	F. L.	0	0	1,800	TANK TRL	3406 GAL	22	0	5	H-P
7051099A	BRIDGEPORT	CT	77/05/16	GASOLINE	F. L.	1	0	60,000	MC301	8000 GAL	22	0	6	H-P
8030416A	EDINA	MO	78/02/28	GASOLINE	F. L.	0	0	30,000	MC306	3803 GAL	22	0	5	H-P
8030611A	LA PLACE	LA	78/01/23	GASOLINE	F. L.	0	0	24,000	TANK TRL	4200 GAL	22	0	5	H-P
8081375A	PARKLAND	WA	78/08/18	GASOLINE	F. L.	0	0	40	TANK TRL	58 GAL	22	0	5	H-P
7050974A	JACKSON	MI	77/05/06	GASOLINE	F. L.	0	0	7	MC306	13 GAL	11	22	5	H-P
8030663A	DUPONT	CO	78/03/08	GASOLINE	F. L.	0	0	100	TANK TRL	178 GAL	22	0	5	H-P
8030982A	KNOXVILLE	TN	78/03/14	GASOLINE	F. L.	0	0	1,500	MC306	3000 GAL	22	0	5	H-P
8080216A	ALBANY	CA	78/07/26	GASOLINE	F. L.	0	0	628	MC306	100 GAL	22	0	5	H-P
7071604A	FRISCO	CO	77/07/21	GASOLINE	F. L.	0	0	4,460	MC306	6800 GAL	22	0	5	H-P
8110592A	CLEVELAND	TN	78/10/18	GASOLINE	F. L.	0	0	495	TANK TRK	816 GAL	22	0	5	H-P
8040098A	WOBURN	MA	78/03/30	GASOLINE	F. L.	0	2	100,000	TANK TRL	8500 GAL	22	0	6	H-P
8040381A	BETHALTO	IL	78/03/23	GASOLINE	F. L.	0	0	100,000	TANK TRL	7900 GAL	2	22	6	H-P
8100359A	MILAN	IL	78/09/22	GASOLINE	F. L.	0	0	10,000	MC306	6400 GAL	22	0	6	H-P
8100109A	OAK HARBOR	OH	78/09/14	GASOLINE	F. L.	0	0	1,500	MC306	100 GAL	22	0	5	H-P
8110667A	FRANKFORT	KY	78/11/07	GASOLINE	F. L.	0	0	0	TANK TRK	1080 GAL	22	0	5	H-P
8080715A	SEATTLE	WA	78/07/14	GASOLINE	F. L.	0	1	500	MC306	1020 GAL	22	0	6	H-P
8070920A	POMONA	CA	77/08/29	GASOLINE	F. L.	0	0	4,300	MC306	4655 GAL	22	0	5	H-P
7080602A	HONEOYE	NY	77/08/05	GASOLINE	F. L.	0	0	1,200	MC306	210 GAL	22	0	5	H-P
7050784A	JACKSONVILLE	FL	77/04/23	GASOLINE	F. L.	1	1	60,000	TANK TRL	7800 GAL	22	0	6	H-P
8041504A	PEARL CITY	HI	78/04/18	GASOLINE	F. L.	0	1	40,000	MC306	8125 GAL	22	0	5	H-P
8071454A	BOARDMAN	OR	78/07/19	GASOLINE	F. L.	0	0	3,000	MC306	4800 GAL	22	0	5	H-P
8050070A	NEW ALBANY	MS	78/04/11	GASOLINE	F. L.	0	0	2,660	MC306	7000 GAL	22	0	5	H-P
8060930A	CASTLE GATE	UT	78/06/05	GASOLINE	F. L.	0	0	76,000	MC306	9000 GAL	22	0	5	H-P
8090080A	PASCAGOULA	MS	78/08/20	GASOLINE	F. L.	0	0	3,000	TANK TRL	4246 GAL	22	0	5	H-P

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8070500A	REIDVILLE	SC	78/07/03	GASOLINE	F. L.	0	0	7,000	MC306	426 GAL	22	0	5	H-P
7091178A	GLEN BURNIE	MD	77/09/15	GASOLINE	F. L.	0	0	35,600	TANK TRL	0	22	0	6	H-P
8050263A	MADISON	WV	78/05/02	GASOLINE	F. L.	0	0	250	TANK TRL	100 GAL	22	0	5	H-P
7050689A	CITY UNKNOWN	OR	75/12/12	GASOLINE	F. L.	0	0	920	TANK TRL	2408 GAL	2	22	5	H-P
7050688A	COLFAX	CA	77/05/05	GASOLINE	F. L.	0	0	1,339	TANK TRL	2652 GAL	22	0	5	H-P
8050693A	MARIANNA	FL	78/04/28	GASOLINE	F. L.	0	1	13,556	TANK TRL	8200 GAL	22	0	6	H-P
7050654A	PORTLAND	OR	75/04/08	GASOLINE	F. L.	0	0	1,500	MC306	4600 GAL	2	22	5	H-P
8050884A	SHEYENNE	ND	78/05/08	GASOLINE	F. L.	0	0	0	MC306	3700 GAL	22	0	5	H-P
8080567A	INDIANAPOLIS	IN	78/08/12	GASOLINE	F. L.	0	0	0	TANK TRK	25 GAL	2	22	5	H-P
7080346A	ROANOKE	VA	77/07/30	GASOLINE	F. L.	0	1	84,000	TANK TRL	7800 GAL	22	0	6	H-P
7050653A	MEDFORD	OR	75/12/12	GASOLINE	F. L.	0	0	18,000	MC306	2024 GAL	22	0	5	H-P
8051566A	BLOOMINGTON	CA	78/05/13	GASOLINE	F. L.	0	0	10,293	MC306	267 GAL	22	0	5	H-P
8070416A	BUFFALO	WY	78/06/26	GASOLINE	F. L.	0	0	1,000	MC306	4500 GAL	2	22	5	H-P
8060273A	WABASH	IN	78/05/25	GASOLINE	F. L.	0	0	150,000	TANK TRL	7800 GAL	22	0	6	H-P
8110233A	ENFIELD	CT	78/10/17	GASOLINE	F. L.	0	0	5,000	TANK TRL	4900 GAL	2	22	5	H-P
7080041A	FRESNO	CA	77/07/23	GASOLINE	F. L.	0	0	2,240	TANK TRL	4480 GAL	22	0	5	H-P
8060347A	HILLS	CA	78/05/23	GASOLINE	F. L.	1	0	5,000	MC306	8550 GAL	22	0	6	H-P
8060756A	BIG SANDY	MT	78/05/31	GASOLINE	F. L.	0	0	0	MC306	7300 GAL	22	0	5	H-P
5040559A	ERWIN	TN	75/04/15	HEPTANE	F. L.	0	0	29,000	MC305	0	2	17	5	H-H
8050733A	AVONDALE	PA	78/05/04	HEPTANE	F. L.	0	0	3	MC307	5 GAL	22	0	5	H-H
6010482A	MAXTON	NC	76/01/08	HEXANE	F. L.	0	0	20,000	MC306	3000 GAL	2	22	5	H-H
4120648A	DESTREHAN	LA	74/11/22	HEXANE	F. L.	0	0	2,000	MC304	0	17	0	5	H-H
6050718A	TURLOCK	CA	76/03/31	HEXANE	F. L.	0	0	74	MC306	100 GAL	22	0	5	H-H
6110287A	OSCEOLA	AR	76/10/27	HEXANE	F. L.	0	0	240	MC303	463 GAL	2	22	5	H-H
4090071A	JERSEY CITY	NJ	74/08/21	INK	F. L.	0	0	0	52	0	17	0	5	H-H
5090467A	WASHINGTON	NJ	75/09/10	INK	F. L.	1	0	60,000	DRUM MTL	0	17	0	6	H-H
6060530A	RAINELLE	WV	76/05/26	INK	F. L.	0	0	5,000	MC306	5400 GAL	22	0	5	H-H
6070747A	MILESBURG	PA	76/06/23	INK	F. L.	0	0	0	MC306	2000 GAL	22	0	5	H-H
7120938A	WHITEHOUSE	OH	77/12/12	INK	F. L.	0	0	0	DRUM MTL	35 GAL	3	22	5	H-H
7050539A	N CLEVELAND	OH	77/04/06	INK	F. L.	0	0	480	MC306	400 GAL	22	0	5	H-P
7070135C	YAZOO CITY	MS	77/06/22	INSECTICIDE LIQ FL	F. L.	0	0	0	BOTL GLS	53 GAL	22	0	5	H-P
8071467A	FLOMATON	AL	78/07/10	INSECTICIDE LIQ FL	F. L.	0	0	5,595	DRUM	55 GAL	22	0	5	H-P
6050718B	TURLOCK	CA	76/03/31	ISOPROPANOL	F. L.	0	0	74	MC306	100 GAL	22	0	5	H-H
4070604A	CHARLESTON	WV	74/06/19	ISOPROPYL ACETATE	F. L.	0	0	22,675	TANK TRL	0	2	17	5	H-P
6120210A	NAPOLEON	OH	76/10/24	LEATHER DRESSING	F. L.	0	0	0	17E	165 GAL	2	22	5	H-H
8090130A	FLORENCE	SC	78/08/23	METHYLAL	F. L.	0	0	0	MC306	3800 GAL	22	0	5	H-H
8120319A	AKRON	OH	78/11/27	METHYLAL	F. L.	0	0	0	DRUM MTL	1 OZS	13	0	5	H-H
5020366B	LITTLE ROCK	AR	75/01/28	METHYL ETHYL KETONE	F. L.	0	0	0	MC307	0	17	0	5	H-H
7040355A	LAKE HARMONY	PA	77/03/30	METHYL ETHYL KETONE	F. L.	0	0	493	MC304	350 GAL	22	0	5	H-H
8050936A	SUMMIT	IL	78/03/09	METHYL ETHYL KETONE	F. L.	0	0	50	MC306	98 GAL	22	0	5	H-H
8090262A	RUPERT	WV	78/06/28	METHYL ETHYL KETONE	F. L.	0	0	3,000	MC306	2600 GAL	22	0	5	H-H
4070343A	LIMA	OH	74/06/28	METHYL METHACRYLATE	F. L.	0	0	15,000	DRUM MTL	0	17	0	5	H-H
8050044A	FLORENCE	KY	78/04/18	METHYL METHACRYLATE	F. L.	0	0	1,398	MC307	3410 LBS	22	0	5	H-H
6060828A	GAULEY	WV	76/05/19	METHYL METHACRYLATE	F. L.	0	0	5,000	MC305	40260 LBS	22	0	5	H-H
8120882A	SULLIVAN	MO	78/12/16	METHYL METHACRYL UN	F. L.	0	0	2,000	MC307	398 GAL	11	22	5	H-H
5040283A	BELTON	KY	75/03/26	MOTOR FUEL N.O.S.	F. L.	0	0	420	MC306	0	17	0	5	H-H
5070344B	CURRENT	UT	75/06/25	MOTOR FUEL N.O.S.	F. L.	0	0	0	MC306	0	17	0	5	H-H
5030357A	NEW ROCKFORD	ND	75/03/04	MOTOR FUEL N.O.S.	F. L.	0	0	9,000	MC306	0	17	0	5	H-H
4020300A	TOPEKA	KS	74/02/11	MOTOR FUEL N.O.S.	F. L.	0	0	3,200	MC306	0	17	0	5	H-H
5030270A	TURPIN	OK	75/01/11	MOTOR FUEL N.O.S.	F. L.	0	0	550	MC306	0	17	0	5	H-H

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5030021A	CASCADE LOCKS	OR	75/02/10	MOTOR FUEL N.O.S.	F. L.	0	0	550	TANK TRL	0	17	0	5	H-H
4020296A	HOLTON	KS	74/02/13	MOTOR FUEL N.O.S.	F. L.	0	0	72	MC305	0	17	0	5	H-H
5110450A	ROLLING FORK	MS	75/11/05	MOTOR FUEL N.O.S.	F. L.	0	0	7,464	TANK TRL	0	17	0	5	H-H
6010495A	W DEERFIELD	IL	76/01/12	MOTOR FUEL N.O.S.	F. L.	0	0	2,500	MC305	8700 GAL	2	22	5	H-H
5010109A	PLAIN	WI	74/12/23	MOTOR FUEL N.O.S.	F. L.	0	0	15,000	MC305	0	17	0	5	H-H
5100637A	SUGAR CITY	DE	75/09/30	MOTOR FUEL N.O.S.	F. L.	0	0	7,500	MC305	0	17	0	5	H-H
5070752A	SHUQUALAK	MS	75/07/17	MOTOR FUEL N.O.S.	F. L.	0	0	60	MC304	0	17	0	5	H-H
4050408A	HURST	TX	74/05/09	MOTOR FUEL N.O.S.	F. L.	0	0	23	TANK TRL	0	2	0	5	H-H
4020216A	WHEATLY	AR	74/02/05	MOTOR FUEL N.O.S.	F. L.	0	0	12,000	MC306	0	2	17	5	H-H
4080959A	ESTACADA	OR	74/08/16	MOTOR FUEL N.O.S.	F. L.	0	0	3,000	MC305	0	2	17	5	H-H
4080548A	LAS CRUCES	NM	74/08/07	MOTOR FUEL N.O.S.	F. L.	0	0	1,548	MC305	0	2	17	5	H-H
5070841A	CAMILLA	GA	75/07/18	MOTOR FUEL N.O.S.	F. L.	0	0	400	MC305	0	17	0	5	H-H
4090749A	ORLANDO	FL	74/09/17	MOTOR FUEL N.O.S.	F. L.	0	0	1,400	MC306	0	17	0	5	H-H
4090439A	MIDWAY	GA	74/08/29	MOTOR FUEL N.O.S.	F. L.	0	0	10,335	TANK TRL	0	17	0	5	H-H
6100496A	RICHFIELD	OH	76/09/21	MOTOR FUEL N.O.S.	F. L.	0	0	750	MC306	1500 GAL	22	0	5	H-H
6061106A	ACKERMAN	MS	76/06/16	MOTOR FUEL N.O.S.	F. L.	0	1	17,000	MC305	7950 GAL	22	0	5	H-H
5030525A	BISHOP	TX	75/03/06	MOTOR FUEL N.O.S.	F. L.	0	0	650	TANK TRL	0	17	0	5	H-P
4060338A	NEW ALBANY	MS	74/05/31	MOTOR FUEL N.O.S.	F. L.	0	0	37,000	TANK TRL	0	17	0	6	H-P
5030771A	BISHOP	TX	75/03/06	MOTOR FUEL N.O.S.	F. L.	0	0	650	TANK TRK	0	17	0	5	H-P
5040048B	HORSESHOE BND	ID	75/03/07	MOTOR FUEL N.O.S.	F. L.	0	0	0	TANK TRK	0	17	0	5	H-P
6061185A	FORT CAMPBELL	TN	76/06/17	MOTOR FUEL N.O.S.	F. L.	0	0	75,000	MC306	7600 GAL	2	22	6	H-P
4010161A	STANFORD	MT	73/12/17	NAPHTHA	F. L.	0	0	4,500	MC305	0	17	0	5	H-H
7061069A	MONROE	LA	77/06/19	NAPHTHA	F. L.	0	0	6,000	MC306	7526 GAL	22	0	6	H-H
7010186F	MODALE	IA	76/12/27	NAPHTHA	F. L.	0	0	0	17E	20 GAL	22	0	6	H-P
5090345A	BIXBY	MO	75/09/03	OIL N.O.S.	F. L.	0	0	1,000	MC303	0	2	17	5	H-H
4100546A	HICKORY	LA	74/09/17	OIL N.O.S.	F. L.	0	0	37,094	TANK TRL	0	17	0	6	H-H
•6040082A	MOUNT GREEN	UT	76/02/08	OIL N.O.S.	F. L.	0	0	170	MC305	200 GAL	22	0	5	H-H
4100859A	HOPEWELL	VA	74/10/23	OIL N.O.S.	F. L.	0	0	18,000	MC306	0	17	0	5	H-H
5120053A	SINCLAIR	WY	75/11/07	OIL N.O.S.	F. L.	0	0	2,700	MC302	0	17	0	5	H-H
•6030625A	MOUNT GREEN	UT	76/02/08	OIL N.O.S.	F. L.	0	0	170	MC305	200 GAL	22	0	5	H-H
4120556A	POINT BLANK	TX	74/11/22	OIL N.O.S.	F. L.	0	0	10,000	TANK TRL	0	17	0	5	H-H
3090199A	HENDERSON	TX	73/08/29	OIL N.O.S.	F. L.	0	0	699	MC307	0	17	0	5	H-H
5050230A	WALDO	OH	75/05/05	OIL N.O.S.	F. L.	0	0	250	MC303	0	17	0	5	H-H
5040756A	SALINA	UT	75/04/09	OIL N.O.S.	F. L.	0	0	0	MC305	0	17	0	5	H-H
3100017A	ATLANTIC CITY	UT	73/09/15	OIL N.O.S.	F. L.	0	0	50	TANK TRL	0	2	17	5	H-H
6120059A	MARLBORO	VT	76/11/22	OIL N.O.S.	F. L.	0	0	30,000	MC305	7000 GAL	22	0	5	H-H
•7070749A	CURRENT	NV	77/07/05	OIL N.O.S.	F. L.	0	0	3,000	MC305	420 GAL	22	0	5	H-H
•7070749B	CURRENT	NV	77/07/05	OIL N.O.S.	F. L.	0	0	3,000	MC305	420 GAL	22	0	5	H-H
7080505A	ARKANSAS CITY	KS	77/07/27	OIL N.O.S.	F. L.	0	0	1,200	TANK TRL	3444 GAL	22	0	5	H-H
8110818A	MYTON	UT	78/10/20	OIL N.O.S.	F. L.	0	0	800	MC306	2310 GAL	2	22	5	H-H
•6060338B	LOST SPRINGS	WY	76/06/01	OIL N.O.S.	F. L.	0	0	450	MC306	1050 GAL	22	0	5	H-P
•6060338A	LOST SPRINGS	WY	76/06/01	OIL N.O.S.	F. L.	0	0	450	MC306	1050 GAL	22	0	5	H-P
4110355A	UHRICHSVILLE	OH	74/10/29	OIL N.O.S.	F. L.	0	0	15,000	TANK TRL	0	2	17	5	H-P
5020094A	N BERGEN	NJ	75/01/18	OIL N.O.S.	F. L.	0	0	15,000	TANK TRL	0	17	0	5	H-P
8111059A	BLOOMFIELD	NM	78/11/03	OIL N.O.S.	F. L.	0	0	450	MC306	1500 GAL	22	0	5	H-P
8111286A	LANDER	WY	78/11/10	OIL N.O.S.	F. L.	0	0	2,000	MC306	4000 GAL	22	0	5	H-P
7080990A	LEITER	WY	77/08/05	OIL N.O.S.	F. L.	0	0	2,600	TANK TRL	8820 GAL	22	0	6	H-P
8120776A	JACKSON	OH	78/12/15	OIL N.O.S.	F. L.	0	0	5	TANK TRL	10 GAL	22	0	5	H-P
8070154A	RICHMOND	CA	78/07/02	OIL N.O.S.	F. L.	0	0	1,300	MC306	600 GAL	22	0	5	H-P
3100468A	COVINGTON	IN	73/10/22	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,000	17H	0	2	14	5	H-H

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5050184A	TRENT	TX	75/04/21	PAINT,ENAM,LAQ,STAN	F. L.	0	0	90	37A	0	7	17	6	H-H
6040570A	NORFOLK	VA	76/04/05	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	37A	5 GAL	22	0	5	H-H
6010045A	BROOKPARK	OH	75/12/03	PAINT,ENAM,LAQ,STAN	F. L.	0	0	100	MC307	30 GAL	11	0	5	H-H
5090813A	DEAN	NJ	75/09/12	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,600	CAN MTL	0	7	0	6	H-H
5070533A	WINSTON-SALEM	NC	75/07/05	PAINT,ENAM,LAQ,STAN	F. L.	0	0	50	37A	0	17	0	5	H-H
6040637A	CLINTON	MO	76/04/07	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	37C	65 GAL	2	22	5	H-H
5020146B	BATAVIA	NY	75/01/30	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	CAN MTL	0	17	0	5	H-H
4050136A	HARRISON	AR	74/05/06	PAINT,ENAM,LAQ,STAN	F. L.	0	0	100	17E	0	17	0	5	H-H
5090815A	SAN PABLO	CA	75/09/11	PAINT,ENAM,LAQ,STAN	F. L.	0	0	200	37A	0	11	0	5	H-H
3110126A	ERWIN	TN	73/10/16	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	DRUM MTL	0	17	0	5	H-H
4100390A	LAGRANGE	GA	74/10/04	PAINT,ENAM,LAQ,STAN	F. L.	0	0	35	CAN MTL	0	3	17	5	H-H
6030890A	CAMP HILL	PA	76/03/13	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	DRUM MTL	55 GAL	22	0	5	H-H
5080780A	RICHMOND	VA	75/08/14	PAINT,ENAM,LAQ,STAN	F. L.	0	0	8	37C	0	3	17	5	H-H
3090208A	SUPERIOR	AZ	73/07/17	PAINT,ENAM,LAQ,STAN	F. L.	0	0	244	PAIL MTL	0	17	0	5	H-H
5100242A	MILROY	PA	75/09/22	PAINT,ENAM,LAQ,STAN	F. L.	0	0	400	17E	0	17	0	5	H-H
•5120690B	COLUMBUS	IN	75/11/26	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	BLANK	0	17	0	5	H-H
4060490A	CHATTANOOGA	TN	74/06/08	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,225	TANK PRT	0	17	0	5	H-H
4060247A	PHILLIPSBURG	PA	74/05/15	PAINT,ENAM,LAQ,STAN	F. L.	0	0	50	DRUM MTL	0	17	0	5	H-H
5120647A	CASPER	WY	75/12/12	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	BLANK	0	17	0	6	H-H
4050602A	NEW ALBANY	MS	74/05/15	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	PAIL MTL	0	2	17	5	H-H
6020465A	SHEFFIELD	AL	76/01/30	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	17E	2 QTS	11	21	5	H-H
•5120690A	COLUMBUS	IN	75/11/26	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,500	BLANK	0	17	0	5	H-H
7100949A	CANFIELD	OH	77/09/21	PAINT ENAM LAQ STAN	F. L.	0	7	3,000	MC307	500 GAL	22	0	5	H-H
6060722A	SPRINGFIELD	MO	76/05/29	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,250	CAN MTL	4 GAL	3	22	5	H-H
6060723A	MELVINDALE	MI	76/06/07	PAINT,ENAM,LAQ,STAN	F. L.	0	0	30	37A	3 GAL	3	22	5	H-H
6060724A	SPRINGFIELD	MO	76/05/29	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,250	CAN MTL	8 GAL	3	22	5	H-H
6110754A	CODY	WY	76/09/23	PAINT,ENAM,LAQ,STAN	F. L.	0	0	2,961	DRUM MTL	935 GAL	22	0	5	H-H
6110284A	FOND DU LAC	WI	76/11/22	PAINT,ENAM,LAQ,STAN	F. L.	0	0	119	37A	10 GAL	22	0	5	H-H
6100112A	UTICA	MO	76/09/26	PAINT,ENAM,LAQ,STAN	F. L.	0	0	300	DRUM MTL	32 GAL	3	22	5	H-H
8030271A	ARDMORE	OK	77/11/21	PAINT ENAM LAQ STAN	F. L.	0	0	7,025	DRUM MTL	1500 GAL	22	0	5	H-H
6090896A	EFFINGHAM	IL	76/09/07	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,900	17E	330 GAL	2	22	5	H-H
6081213A	LA PORTE CITY	IA	76/08/24	PAINT,ENAM,LAQ,STAN	F. L.	0	0	10,000	17C	100 GAL	22	0	5	H-H
•7040247A	LEWISTOWN	PA	77/03/31	PAINT ENAM LAQ STAN	F. L.	0	0	2,000	DRUM MTL	220 GAL	7	22	2	H-H
6050941A	COURTLAND	VA	76/04/29	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,500	37A	700 GAL	22	0	5	H-H
•7040247C	LEWISTOWN	PA	77/03/31	PAINT ENAM LAQ STAN	F. L.	0	0	8,800	DRUM MTL	1100 GAL	7	22	2	H-H
6070698A	CRESTLINE	OH	76/07/03	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	37C	45 GAL	22	0	5	H-H
6070894A	BIRMINGHAM	AL	76/07/02	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	17E	55 GAL	2	22	5	H-H
•6071068A	CEDAR CITY	UT	76/07/08	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,500	17E	300 GAL	22	0	5	H-H
•6071068B	CEDAR CITY	UT	76/07/08	PAINT,ENAM,LAQ,STAN	F. L.	0	0	1,500	17H	300 GAL	22	0	5	H-H
8090636A	S KEARNY	NJ	78/08/26	PAINT ENAM LAQ STAN	F. L.	0	0	20,000	TANK PRT	2500 GAL	22	0	5	H-H
6110242A	BRIGHTON	MI	76/10/20	PAINT,ENAM,LAQ,STAN	F. L.	0	0	35,900	MC306	2278 GAL	11	22	5	H-P
6120798A	FLORENCE	TX	76/12/10	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	CAN MTL	25 GAL	22	0	5	H-P
4090480A	INDIANOLA	MS	74/09/01	PAINT,ENAM,LAQ,STAN	F. L.	0	0	14,378	TANK TRL	0	17	0	5	H-P
5030686A	CARTERSVILLE	GA	75/03/12	PAINT,ENAM,LAQ,STAN	F. L.	0	0	0	17H	0	17	0	5	H-P
5040110A	KENNER	LA	75/03/25	PAINT,ENAM,LAQ,STAN	F. L.	0	0	21,000	17H	0	17	0	5	H-P
5081015A	SUMTER	SC	75/08/24	PAINT,ENAM,LAQ,STAN	F. L.	0	0	20,000	CAN MTL	0	17	0	5	H-P
5080099A	KANSAS CITY	MO	75/07/24	PAINT,ENAM,LAQ,STAN	F. L.	0	0	200	MC306	0	17	0	5	H-P
5070146A	WILLIAMSTOWN	OH	75/06/28	PAINT,ENAM,LAQ,STAN	F. L.	0	0	6,000	17E/17H	0	17	0	5	H-P
8081492A	MORGANTON	NC	78/08/14	PAINT ENAM LAQ STAN	F. L.	0	0	0	MC306	5 GAL	22	0	5	H-P
8081343A	CARTERET	NJ	78/08/05	PAINT ENAM LAQ STAN	F. L.	0	0	25,000	57	200 GAL	22	0	5	H-P

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•8010120C	DESERT CENTER	CA	77/11/23	PAINT ENAM LAQ STAN	F. L.	0	0	75,000	CAN MTL	2240 GAL	22	0	5	H-P
•8010120B	DESERT CENTER	CA	77/11/23	PAINT ENAM LAQ STAN	F. L.	0	0	15,000	PAIL	470 GAL	22	0	5	H-P
•8010120A	DESERT CENTER	CA	77/11/23	PAINT ENAM LAQ STAN	F. L.	0	0	10,000	DRUM	240 GAL	22	0	5	H-P
5040538A	LABADIE	MO	75/02/25	PETROLEUM DISTILLAT	F. L.	0	0	10,000	MC306	0	11	17	5	H-H
4120532A	CIRCLE PINES	MN	74/12/19	PETROLEUM DISTILLAT	F. L.	0	0	16,000	TANK TRL	0	2	17	5	H-H
8060496A	VINTON	IA	78/05/25	PETROLEUM DISTILLAT	F. L.	0	0	3,000	MC305	3000 GAL	22	0	5	H-H
5070005A	GERMAN	PA	73/05/08	PETROLEUM DISTILLAT	F. L.	0	0	0	TANK TRK	0	17	0	1	H-P
4070866A	FLOREIN	LA	74/07/18	PETROLEUM DISTILLAT	F. L.	0	0	1,050	MC305	0	17	0	5	H-P
5100735A	RUSSELL CITY	PA	75/10/10	PETROLEUM DISTILLAT	F. L.	0	0	353	MC306	0	2	17	5	H-P
4070105A	LONGVIEW	TX	74/06/04	PETROLEUM NAPHTHA	F. L.	0	0	0	TANK TRL	0	17	0	5	H-H
8020753A	CIRCLEVILLE	OH	78/01/10	PETROLEUM NAPHTHA	F. L.	0	0	5,000	MC305	6691 GAL	22	0	5	H-H
3070419A	HODGKINS	IL	73/07/05	PETROLEUM NAPTHA	F. L.	0	0	300	MC306	0	2	0	5	H-P
5120464A	ANDREWS	TX	75/12/04	PETROLEUM NAPHTHA	F. L.	0	0	1,870	TANK TRL	0	11	0	5	H-P
5090602A	VANPORT	PA	75/09/02	PETROLEUM NAPHTHA	F. L.	0	0	11,270	MC306	0	17	0	5	H-P
6110125A	BLAWNOX	PA	76/10/21	PETROLEUM NAPHTHA	F. L.	0	0	0	MC306	2500 GAL	22	0	5	H-P
5020430B	KANSAS CITY	MO	75/01/15	PYRIDINE	F. L.	0	0	0	BLANK	0	7	17	6	H-H
5080803A	SWEDESBORO	NJ	75/08/08	RESIN SOLUTION	F. L.	0	0	0	MC303	0	17	0	5	H-H
5070138A	FREEMONT	OH	75/06/19	RESIN SOLUTION	F. L.	0	0	5,300	17E	0	17	0	5	H-H
6030972A	LIME CITY	OH	76/03/16	RESIN SOLUTION	F. L.	0	0	20,000	17E	770 GAL	22	0	5	H-H
7070964A	EL PASO	TX	77/06/28	RESIN SOLUTION	F. L.	0	0	0	DRUM MTL	1 GAL	2	22	5	H-H
6050515A	OAKLAND	CA	76/04/25	RESIN SOLUTION	F. L.	0	0	50	MC306	25 GAL	11	22	5	H-H
•8031054B	MISSOULA	MT	78/03/06	RESIN SOLUTION	F. L.	0	0	25,000	MC312	4800 GAL	2	22	5	H-H
•8031054A	MISSOULA	MT	78/03/06	RESIN SOLUTION	F. L.	0	0	25,000	MC306	4000 GAL	2	22	5	H-H
7071594A	SANTA CLARA	CA	77/06/28	RESIN SOLUTION	F. L.	0	0	70,000	17E	175 GAL	2	22	5	H-H
8061448A	GREENFIELD	IN	78/06/05	RESIN SOLUTION	F. L.	0	0	2,000	MC306	27940 LBS	22	0	5	H-H
8071201A	BUTTONWILLOW	CA	78/07/07	RESIN SOLUTION	F. L.	0	0	50	17E	3 GAL	22	0	5	H-H
8071121A	GRAND RAPIDS	MI	78/07/18	RESIN SOLUTION	F. L.	0	0	200	17E	30 GAL	22	0	5	H-H
4100424A	BISMARCK	ND	74/09/18	ROAD ASPH TAR LIQ	F. L.	0	0	2,000	TANK TRK	0	17	0	5	H-H
6061129Z	MISSION	SD	76/06/15	ROAD ASPH TAR LIQ	F. L.	0	0	2,000	MC306	6500 GAL	2	22	5	H-H
6060790A	HARRISON	NE	76/06/03	ROAD ASPH TAR LIQ	F. L.	0	0	10,000	MC305	7700 GAL	2	22	6	H-H
4060040A	LAS VEGAS	NV	74/05/22	ROAD ASPH TAR LIQ	F. L.	0	0	75	TANK TRK	0	17	0	5	H-P
6040057A	EADS	CO	76/03/25	SOLVENTS N.O.S.	F. L.	0	0	418	MC306	781 GAL	22	0	5	H-H
3120235A	CANONSBURG	PA	73/12/12	SOLVENTS N.O.S.	F. L.	0	0	320	MC306	0	17	0	5	H-H
6070043A	BUTLER	PA	76/06/14	SOLVENTS N.O.S.	F. L.	0	0	1,700	MC306	3500 GAL	22	0	5	H-H
7040028A	MORGANTOWN	WV	74/10/04	SOLVENTS N.O.S.	F. L.	0	0	4,500	MC306	1000 GAL	22	0	5	H-H
7120943A	SLICK ROCK	CO	77/12/08	SOLVENTS N.O.S.	F. L.	0	0	2,100	MC306	700 GAL	22	0	5	H-H
7040939A	CHARLOTTE	NC	77/03/20	STYRENE MONOMER INH	F. L.	0	0	5	17E	8 OZS	22	0	5	H-H
6040569A	NORFOLK	VA	76/04/05	TAR LIQUID	F. L.	0	0	0	BLANK	5 GAL	22	0	5	H-H
6110240A	PAGOSA SPGS	CO	76/10/28	TAR LIQUID	F. L.	0	0	1,250	MC305	6500 GAL	2	22	5	H-H
•6060382A	RAWLINS	WY	76/05/19	TAR LIQUID	F. L.	0	0	2,000	MC302	3600 GAL	22	0	5	H-H
•6060382B	RAWLINS	WY	76/05/19	TAR LIQUID	F. L.	0	0	2,000	MC305	3600 GAL	22	0	5	H-H
6010429A	HAMLET	NC	76/01/06	TOLUOL	F. L.	0	0	3,600	MC306	1500 GAL	22	0	5	H-H
5080677A	GREENVILLE	GA	75/08/11	TOLUOL	F. L.	0	0	9,100	TANK TRL	0	2	17	5	H-H
7070221A	WALLSBURG	UT	77/06/17	TOLUENE	F. L.	0	0	35,000	MC303	3737 GAL	22	0	5	H-H
7050164A	ROANOKE	VA	75/07/29	TOLUENE	F. L.	0	0	25,000	MC306	3780 GAL	22	0	5	H-H
8090511A	SILVER CITY	NC	78/08/23	TOLUENE	F. L.	0	0	1,500	TANK TRL	2000 GAL	22	0	5	H-H
4010021A	DAMEN	IL	73/12/21	TOLUOL	F. L.	0	0	110	17E	0	16	17	5	H-P
6081176A	FREEPORT	IL	76/08/18	TOLUOL	F. L.	0	0	200	MC300	300 GAL	22	0	5	H-P
7010186B	MODALE	IA	76/12/27	TOLUENE	F. L.	0	0	0	TANK TRK	120 GAL	22	0	6	H-P
4020099A	STEVENSVILLE	MI	74/02/05	TOLUOL	F. L.	0	0	0	TANK TRL	0	11	0	5	H-P

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5010547A	BIRMINGHAM	AL	75/01/16	TOLUOL	F. L.	0	0	3,340	MC306	0	17	0	5	H-P
4080693A	CARTERET	NJ	74/08/14	TOLUOL	F. L.	0	0	15,000	MC306	0	2	0	5	H-P
3120095A	KINGS CREEK	SC	73/11/09	VINYL ACETATE	F. L.	0	0	21,500	MC305	0	2	17	6	H-H
4010234A	GANADO	TX	73/12/03	VINYL ACETATE	F. L.	0	0	4,450	MC306	0	17	0	5	H-H
5020366C	LITTLE ROCK	AR	75/01/28	VINYL ACETATE	F. L.	0	0	0	MC307	0	17	0	5	H-H
5010173A	MARSHFIELD	MO	74/12/24	WOOD ALCOHOL	F. L.	0	0	3,000	TANK TRK	0	17	0	5	H-H
4040303A	NASHVILLE	TN	74/03/30	WOOD ALCOHOL	F. L.	0	0	200	DRUM MTL	0	3	17	5	H-H
5101144A	HOLTON	KS	75/10/15	WOOD ALCOHOL	F. L.	0	0	0	MC307	0	17	0	5	H-H
4020154A	PORT ALLEN	LA	74/01/31	WOOD ALCOHOL	F. L.	0	1	360,000	MC305	0	2	17	6	H-H
7120573A	BAY ST LOUIS	MS	77/11/30	METHYL ALCOHOL	F. L.	0	0	60,000	TANK TRL	4800 GAL	22	0	5	H-H
8111314A	BEDMINISTER	NJ	78/09/25	METHYL ALCOHOL	F. L.	0	0	1,000	MC306	573 GAL	22	0	5	H-H
8070149A	TONAWANDA	NY	78/05/30	METHYL ALCOHOL	F. L.	0	0	600	MC305	972 GAL	22	0	5	H-H
4050011A	ROCK SPRINGS	WY	74/04/09	WOOD ALCOHOL	F. L.	0	0	11,800	TANK TRL	0	2	0	6	H-P
3110166D	PALMENTO	FL	73/10/30	WOOD ALCOHOL	F. L.	0	0	3,400	17E	0	0	0	6	H-P
8080320A	OLD MONROE	MO	78/07/28	METHYL ALCOHOL	F. L.	0	0	30,000	MC305	4900 GAL	2	22	5	H-P
4090243A	CATAULA	GA	74/08/07	XYLOL (XYLENE)	F. L.	0	0	11,206	TANK TRL	0	2	17	5	H-H
5080152A	LEXINGTON	NC	75/06/28	XYLOL (XYLENE)	F. L.	0	0	100	17E	0	3	17	5	H-H
8070372A	BERLIN	OH	78/06/10	XYLENE (XYLOL)	F. L.	0	0	0	17E	100 GAL	22	0	5	H-H
7010186C	MODALE	IA	76/12/27	XYLENE (XYLOL)	F. L.	0	0	0	TANK TRK	235 GAL	22	0	6	H-P
8111320B	CAMERON	WI	78/11/15	XYLENE (XYLOL)	F. L.	0	0	3,000	57	2750 GAL	22	0	6	H-P
4050022A	DUNNSVILLE	NY	74/04/03	FLAM SOLIDS N.O.S.	F. S.	0	10	0	LINR PLS	0	17	0	6	H-H
•8040022A	FORT WAYNE	IN	78/03/07	FLAM SOLIDS N.O.S.	F. S.	0	0	1,000	DRUM FBR	65 LBS	22	0	5	H-H
•8040022B	FORT WAYNE	IN	78/03/07	FLAM SOLIDS N.O.S.	F. S.	0	0	504	BAG PPR	65 LBS	22	0	5	H-H
7020822A	ERIE	PA	77/02/04	PHOSPHORUS PENTASUL	F. S.	0	0	6,500	56	35 LBS	22	0	5	H-H
8020959A	BELLEVILLE	IN	78/02/17	PHOSPHORUS PENTASUL	F. S.	0	0	12,000	56	2000 LBS	2	22	5	H-H
4040581A	ATLANTA	GA	74/03/27	SMOKELESS P[illegible]R <100	F. S.	0	0	0	CAN MTL	0	4	0	1	H-H
6061174B	PRAIRIE VIEW	TX	76/06/07	SODIUM HYDROSULFITE	F. S.	0	1	250	BAG PLS	5 PTS	22	0	5	H-H
6030978A	MADERA	CA	76/02/08	AMMONIUM NITRATE-NC	OXIDIZR	0	0	3,358	BLANK	29500 LBS	22	0	5	H-H
5080070A	SUBLETT	ID	75/07/31	AMMONIUM NITRATE-NC	OXIDIZR	0	0	40,000	MC312	0	17	0	5	H-H
7030444A	LEVAN	UT	77/03/02	AMMONIUM NITRATE-NC	OXIDIZR	0	0	1	TANK TRL	200 LBS	2	22	5	H-H
7030975A	FRACKVILLE	PA	77/03/18	AMMONIUM NITRATE-NC	OXIDIZR	0	0	5,000	TANK STG	4500 LBS	22	0	5	H-P
8050927A	MERCER CNTY	WV	78/04/27	AMMONIUM NITRATE-NC	OXIDIZR	0	0	3,000	TANK TRL	2000 LBS	22	0	5	H-P
7040870A	BAYARD	NM	75/05/08	AMMON NITR FERT <.2	OXIDIZR	0	0	320	TANK TRL	9620 LBS	2	22	5	H-P
8100066A	CLIFTON	AZ	78/09/11	AMMON NITR FERT <.2	OXIDIZR	0	0	259	TANK TRL	4800 LBS	22	0	5	H-P
4120673A	OCQUEOC TWP	MI	74/12/13	AMMON NITR FERT	OXIDIZR	0	0	6,800	TANK TRK	0	14	0	5	H-P
7050904A	TREECE	KS	77/03/07	AMMON NITR FERT <.2	OXIDIZR	0	0	7,500	TANK TRL	2500 LBS	22	0	5	H-P
7060016A	SHELBURN	IN	75/04/30	AMMON NITR FERT <.2	OXIDIZR	0	0	3,623	TANK TRL	18000 GAL	22	0	5	H-P
8010275A	WITOKA	MN	77/12/13	AMMON NITR FERT <.2	OXIDIZR	0	0	900	TANK FRT	7000 LBS	22	0	5	H-P
5060536A	FINLEY	WA	75/06/08	AMMON NITR MIX FERT	OXIDIZR	0	0	15,000	MC305	0	17	0	5	H-H
6040085A	POLO	IL	76/03/26	AMMON NITR MIX FERT	OXIDIZR	0	0	25	BLANK	100 LBS	22	0	5	H-H
7050900A	CONWAY	IA	77/05/13	AMMON NITR MIX FERT	OXIDIZR	0	0	3,500	TANK TRL	1600 GAL	2	22	5	H-H
•6070550B	MALHAUER	OR	76/06/23	AMMON NITR MIX FERT	OXIDIZR	0	0	4,500	MC306	900 GAL	22	0	5	H-H
6060142A	ROLLING PR	IN	76/04/09	AMMON NITR MIX FERT	OXIDIZR	0	0	136	HOPPER T	2510 LBS	22	0	5	H-H
•6070550A	MALHAUER	OR	76/06/23	AMMON NITR MIX FERT	OXIDIZR	0	0	8,000	TANK TRK	1800 GAL	22	0	5	H-H
•7050691A	EASTON	MD	77/03/15	CA HYPOCHLORITE MIX	OXIDIZR	0	0	100	DRUM FBR	40 LBS	22	0	5	H-H
•7050691B	EASTON	MD	77/03/15	CA HYPOCHLORITE MIX	OXIDIZR	0	0	100	DRUM FBR	40 LBS	22	0	5	H-H
•7050691C	EASTON	MD	77/03/15	CA HYPOCHLORITE MIX	OXIDIZR	0	0	44	BOX FBR	20 LBS	22	0	5	H-H
•7070920B	DUBLIN	GA	77/07/08	CA HYPOCHLORITE MIX	OXIDIZR	0	0	17,500	37A	7000 LBS	22	0	6	H-H
•7070920A	DUBLIN	GA	77/07/08	CA HYPOCHLORITE MIX	OXIDIZR	0	0	32,500	21C	32000 LBS	22	0	6	H-H
6100438A	HAPEVILLE	GA	76/10/11	CA HYPOCHLORITE MIX	OXIDIZR	0	0	300	21C	15 LBS	22	0	5	H-H

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3110166C	PALMENTO	FL	73/10/30	CA HYPOCHLORITE MIX	OXIDIZR	0	0	3,400	BAG PPR	0	3	0	6	H-P
3080055A	LOS ANGELES	CA	73/07/10	CA HYPOCHLORITE MIX	OXIDIZR	1	2	30,000	BOX FBR	0	17	0	5	H-P
5020431A	KANSAS CITY	MO	75/01/15	CHROMIC ACID	OXIDIZR	0	0	31	BLANK	0	7	17	6	H-H
4080401A	KANSAS CITY	MO	74/07/31	CHROMIC ACID	OXIDIZR	0	0	50	LINR PLS	0	17	0	5	H-H
8030377A	SANTA ANA	CA	78/02/22	HYDROGEN PEROX 8-40	OXIDIZR	0	0	761	BOTL PLS	12 GAL	22	0	5	H-H
8030377B	SANTA ANA	CA	78/02/22	NITRIC ACID >40%	OXIDIZR	0	0	754	BOTL GLS	12 GAL	22	0	5	H-H
8020126A	OSKALOOSA	IA	78/01/20	NITRIC ACID FUMING	OXIDIZR	0	0	130	MC311	35 GAL	22	0	5	H-H
4110342A	CHOWCHILLA	CA	74/11/05	NITRO CARBO NITRATE	OXIDIZR	0	0	1,000	BAG PPR	0	2	17	5	H-H
4110342B	CHOWCHILLA	CA	74/11/05	NITRO CARBO NITRATE	OXIDIZR	0	0	0	CONT PLS	0	2	17	5	H-H
7110422Z	LORAIN	OH	77/11/22	NITRO CARBO NITRATE	OXIDIZR	0	0	0	BAG PPR	0	22	0	5	H-H
4050199A	DECATUR	IN	74/04/04	NITRO CARBO NITRATE	OXIDIZR	0	0	144	LINR PLS	0	17	0	5	H-P
4040202A	W FRANKFORD	IL	73/12/18	NITRO CARBO NITRATE	OXIDIZR	0	0	2,500	BAG PPR	0	7	17	2	H-P
7010394C	WELLPINIT	WA	76/12/23	NITRO CARBO NITRATE	OXIDIZR	0	0	3,132	LINR PLS	46 LBS	22	0	5	H-P
6020082A	BABBIT	MN	76/01/24	NITRO CARBO NITRATE	OXIDIZR	0	0	7,000	HOPPER T	10000 LBS	22	0	5	H-P
6070664C	ENFIELD	NH	76/06/10	NITRO CARBO NITRATE	OXIDIZR	0	0	8,000	BAG PPR	10800 LBS	2	22	5	H-P
7071514A	W LIBERTY	KY	77/07/14	NITRO CARBO NITRATE	OXIDIZR	0	0	6,500	BAG PPR	13800 LBS	22	0	5	H-P
8030659A	HAZARD	KY	78/03/02	NITRO CARBO NITRATE	OXIDIZR	0	0	2,000	BAG PPR	2500 LBS	22	0	5	H-P
6060725A	SPRINGFIELD	MO	76/05/29	OXI MATERIAL N O S	OXIDIZR	0	0	1,250	BOTL PLS	1 PTS	3	22	5	H-H
7050318A	CHARLOTTE	NC	77/02/07	OXI MATERIAL N.O.S.	OXIDIZR	0	0	15	BOTL	8 QTS	22	0	5	H-H
6030392A	LAFAYETTE	AL	76/02/22	PEROXIDE ORGANIC L	OXIDIZR	0	0	660	JUG PLS	55 GAL	22	0	5	H-H
6040258A	HARRIMAN	TN	76/03/29	PEROX ORGANICNOSL/S	OXIDIZR	0	0	10,000	2U	20 GAL	22	0	5	H-P
8110801A	CHOWCHILLA	CA	78/10/10	SODIUM CHLORATE	OXIDIZR	0	0	1,000	TANK PRT	1013 GAL	22	0	5	H-P
3080382A	KENNEDALE	TX	73/08/08	ANHYDROUS AMMONIA	NONF.G.	0	0	30	MC331	0	17	0	5	H-H
4110340A	MITCHELL	SD	74/11/06	ANHYDROUS AMMONIA	NONF.G.	0	0	500	MC331	0	17	0	5	H-H
5040692A	GUYMON	OK	75/04/10	ANHYDROUS AMMONIA	NONF.G.	0	0	4,200	MC331	0	17	0	5	H-H
7061522A	FRUITA	CO	77/05/27	AMMONIA ANHYDROUS	NONF.G.	0	0	250	MC330	11000 GAL	22	0	5	H-H
7050219A	CERESCO	NE	77/04/29	AMMONIA ANHYDROUS	NONF.G.	0	0	875	TANK TRL	1945 GAL	22	0	5	H-H
6050911A	HOUSTON	TX	76/05/11	AMMONIA ANHYDROUS	NONF.G.	4	150	0	MC331	7553 GAL	22	0	7	H-H
8060259A	WINTHROP	IA	78/05/02	AMMONIA ANHYDROUS	NONF.G.	0	0	1,000	MC331	3000 GAL	22	0	5	H-H
8070418A	PHOENIX	AZ	78/06/28	AMMONIA ANHYDROUS	NONF.G.	0	0	0	MC330	1 GAL	22	0	5	H-H
6120146A	DETROIT	MI	76/11/20	AMMONIA ANHYDROUS	NONF.G.	0	2	65,000	MC330	8350 GAL	22	0	6	H-P
6020580A	PENDLETON	OR	74/05/05	AMMONIA ANHYDROUS	NONF.G.	0	0	8,000	TANK PRT	500 GAL	22	0	5	H-P
5100563A	OLD GLORY	TX	75/04/10	ANHYDROUS AMMONIA	NONF.G.	0	0	22,000	MC330	0	17	0	5	H-P
6081021A	HARTLINE	WA	76/08/06	AMMONIA ANHYDROUS	NONF.G.	0	0	970	TANK PRT	1300 GAL	22	0	5	H-P
5080382A	SPRINGFIELD	OH	75/06/19	ANHYDROUS AMMONIA	NONF.G.	0	0	0	MC330	0	17	0	1	H-P
6050492A	MOSCOW	ID	76/04/27	AMMONIA ANHYDROUS	NONF.G.	0	2	90	MC331	74 GAL	22	0	5	H-P
5100564A	LUBBOCK	TX	75/08/25	ANHYDROUS AMMONIA	NONF.G.	0	0	23,000	MC330	0	17	0	5	H-P
7110166A	STEAMBOAT SPG	CO	77/10/21	AMMONIA ANHYDROUS	NONF.G.	0	0	3,000	TANK PRT	4500 LBS	22	0	5	H-P
8050250A	TAMPA	FL	78/04/09	AMMONIA ANHYDROUS	NONF.G.	0	0	55,000	TANK TRL	100 GAL	22	0	5	H-P
3070667A	DOWNINGTOWN	PA	73/07/01	ARGON PRESS LIQUID	NONF.G.	0	0	0	TANK TRK	0	17	0	5	H-P
6110611A	W LEBANON	IN	76/10/25	CO2 LIQUIFIED	NONF.G.	1	0	45,000	MC331	4315 GAL	22	0	5	H-H
7101105A	CORRIGAN	TX	77/10/06	CO2 LIQUIFIED	NONF.G.	0	0	300	MC331	5880 GAL	22	0	5	H-P
8080790A	N LITTLE ROCK	AR	78/07/20	CO2 LIQUIFIED	NONF.G.	0	0	700	MC331	32800 LBS	22	0	5	H-P
8100449A	HAGERSTOWN	MD	78/09/14	CO2 LIQUIFIED	NONF.G.	0	0	30	MC331	400 LBS	22	0	5	H-P
3110166A	PALMETTO	FL	73/10/30	CHLORINE	NONF.G.	0	0	3,400	3A	0	3	0	6	H-P
7070737F	ATLANTA	GA	77/06/29	COMPR GASES NOS NFG	NONF.G.	0	0	0	CAN AERO	1020 OZS	22	0	5	H-H
8080414A	TYLER	TX	78/06/28	COMPR GASES NOS NFG	NONF.G.	0	0	0	MC331	1 GAL	22	0	5	H-H
5070943A	STRATFORD	TX	75/07/17	HELIUM	NONF.G.	0	0	1,750	3T	0	17	0	5	H-H
5070942A	LOS ANGELES	CA	75/07/11	HELIUM	NONF.G.	0	0	20,000	TANK TRL	0	17	0	5	H-H
7050368A	CORSICANA	TX	77/04/07	HELIUM	NONF.G.	0	0	45,000	3T	15400 CFT	22	0	5	H-H

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7090731A	SOMERSET	PA	77/07/08	HELIUM	NONF.G.	0	0	30,000	TANK TRK	11000 GAL	0	0	5	H-H
7040953A	BOISE CITY	OK	75/11/01	HELIUM	NONF.G.	0	0	0	3AA	36840 CFT	0	0	5	H-H
7090068A	ST LOUIS	MO	77/08/19	HELIUM	NONF.G.	0	0	4,500	3T	3000 LBS	22	0	5	H-H
8101214A	KNOXVILLE	TN	78/10/02	HELIUM	NONF.G.	0	0	20,000	TANK TRL	8500 GAL	22	0	5	H-H
7050941A	W LAWRENCE	KS	77/04/28	HELIUM	NONF.G.	0	0	20,400	TANK TRL	8270 LBS	2	22	5	H-P
8040486A	NEWARK	NJ	78/02/27	HELIUM	NONF.G.	0	0	16,000	TANK TRL	5900 GAL	22	0	5	H-P
7020355A	COLUMBUS	OH	77/01/19	MONOCHLORODIFLUORME	NONF.G.	0	0	10,152	MC331	1836 GAL	22	0	5	H-H
5040217A	SAN ANTONIO	TX	75/03/20	NITROGEN	NONF.G.	0	0	150	3A	0	17	0	5	H-P
4070862A	PRYOR	OK	74/07/11	NITROUS OXIDE	NONF.G.	0	0	12,936	CYL MTL	0	17	0	5	H-H
•6050843A	MCCONNELLSBG	PA	76/05/10	OXYGEN	NONF.G.	0	0	69	3AA	3300 CFT	22	0	5	H-P
•6050843B	MCCONNELLSBG	PA	76/05/10	OXYGEN	NONF.G.	0	0	69	3AA	3960 CFT	22	0	5	H-P
7080109A	CHICAGO	IL	77/07/18	OXYGEN	NONF.G.	0	0	48	CYL MTL	8000 CFT	22	0	5	H-P
•8100329B	BATTLE MTN	NV	78/09/27	ACETYLENE	F. G.	0	0	10	8AL	10 CFT	22	0	5	H-P
•8100329C	BATTLE MTN	NV	78/09/27	ACETYLENE	F. G.	0	0	10	8	10 CFT	22	0	5	H-P
•8100329A	BATTLE MTN	NV	78/09/27	ACETYLENE	F. G.	0	0	10	8	10 CFT	22	0	5	H-P
5120644A	CASPER	WY	75/12/12	COMPR GASES NOS FG	F. G.	0	0	0	BLANK	0	17	0	6	H-H
5120646A	CASPER	WY	75/12/12	COMPR GASES NOS FG	F. G.	0	0	0	CAN AERO	0	17	0	6	H-H
•4110163B	ABILENE	TX	74/10/23	COMPR GASES NOS FG	F. G.	0	0	0	CAN AERO	0	17	0	5	H-P
•4110163C	ABILENE	TX	74/10/23	COMPR GASES NOS FG	F. G.	0	0	0	CAN AERO	0	17	0	5	H-P
8110541A	CHICAGO	IL	78/09/12	COMPR GASES NOS FG	F. G.	0	1	1	TANK TRL	1 GAL	22	0	5	H-P
8080746A	SPRINGFIELD	IL	78/07/04	COMPR GASES NOS FG	F. G.	0	0	0	TANK TRL	100 OZS	22	0	5	H-P
4070081A	NATCHEZ	MS	74/06/10	ETHYLENE	F. G.	0	0	10,000	MC330	0	17	0	5	H-H
8030198A	SHIPROCK	NM	78/02/01	HYDROGEN	F. G.	0	0	125	3AAX	6279 CFT	22	0	5	H-H
8060899A	WHITING	IN	78/05/27	HYDROGEN	F. G.	1	1	200,000	3AA	200000 CFT	22	0	8	H-H
6120158A	FORT LEE	NJ	76/11/20	HYDROGEN	F. G.	0	0	140	TANK TRL	15000 CFT	22	0	6	H-P
6030337A	ROCKFORD	IL	76/02/25	HYDROGEN	F. G.	0	0	40,000	3AA	2000 CFT	7	22	6	H-P
3100378A	OCEANSIDE	CA	73/09/10	HYDROGEN	F. G.	0	0	15,000	3AA	0	17	0	1	H-P
5030544A	DANBURY	CT	75/03/24	HYDROGEN	F. G.	0	0	261	TANK TRL	0	17	0	1	H-P
5050530A	ALBERTA CN	ZZ	75/05/10	HYDROGEN	F. G.	0	0	40	3AA	0	17	0	5	H-P
8050883A	FAIRVIEW	NC	78/05/09	HYDROGEN	F. G.	0	0	1,000	3AAX	126103 CFT	22	23	5	H-P
8020218A	HAUBSTADT	IN	78/01/19	HYDROGEN LIQ	F. G.	0	0	75,000	TANK TRL	8050 GAL	22	0	6	H-H
4050002A	BOONVILLE	CA	74/04/22	LIQ PETROLEUM GAS	F. G.	0	0	1,600	TANK TRL	0	17	0	5	H-H
6010161A	FRISCO	CO	75/12/27	LIQ PETROLEUM GAS	F. G.	0	0	0	MC330	9100 GAL	2	22	5	H-H
4050159A	BOONVILLE	CA	74/04/22	LIQ PETROLEUM GAS	F. G.	0	0	8,600	MC331	0	17	0	5	H-H
3110401A	GOSHEN	VA	73/10/20	LIQ PETROLEUM GAS	F. G.	0	0	104,400	MC330	0	17	0	5	H-H
3110208A	S GRAHAM	NC	73/11/08	LIQ PETROLEUM GAS	F. G.	0	0	2	TANK TRL	0	17	0	6	H-H
5110713A	NEWTON	KS	75/11/10	LIQ PETROLEUM GAS	F. G.	0	0	4,124	MC331	0	17	0	5	H-H
4110673A	SARCOXIA	MO	74/11/15	LIQ PETROLEUM GAS	F. G.	0	0	1,100	MC330	0	17	0	5	H-H
5010496A	IDAHO SPGS	CO	75/01/04	LIQ PETROLEUM GAS	F. G.	0	1	23,000	TANK TRL	0	2	0	5	H-H
5110731A	COURTLAND	VA	75/10/19	LIQ PETROLEUM GAS	F. G.	0	0	0	TANK TRL	0	17	0	5	H-H
7020121A	PETERSON	NE	77/01/19	LIQ PETROLEUM GAS	F. G.	0	0	1,418	MC330	5400 GAL	2	22	5	H-H
8020326A	PAGOSA SPGS	CO	78/01/20	LIQ PETROLEUM GAS	F. G.	0	0	2,000	MC312	8280 GAL	2	22	5	H-H
7010562A	MOFFUTT AFB	NE	77/01/10	LIQ PETROLEUM GAS	F. G.	0	0	2,000	MC330	9000 GAL	22	0	5	H-H
6090252A	FLINT	MI	76/08/19	LIQ PETROLEUM GAS	F. G.	1	7	0	MC330	9000 GAL	2	22	8	H-H
7070827A	RAWLINS	WY	77/06/22	LIQ PETROLEUM GAS	F. G.	0	0	830	MC330	4000 GAL	22	0	5	H-H
8010801A	LOS ANGELES	CA	77/12/13	LIQ PETROLEUM GAS	F. G.	0	0	0	TANK TRK	100 GAL	22	0	5	H-H
7020903A	DETROIT	MI	77/02/07	LIQ PETROLEUM GAS	F. G.	1	0	37,000	MC331	9000 GAL	2	22	4	H-H
8090749A	LATONVILLE	CA	78/08/31	LIQ PETROLEUM GAS	F. G.	0	0	10,000	TANK TRL	10300 GAL	2	22	5	H-H
8120495A	BISHOP	CA	78/11/25	LIQ PETROLEUM GAS	F. G.	0	0	0	39	10 LBS	22	0	2	H-H
6040711A	PRESQUE ISLE	ME	76/03/31	LIQ PETROLEUM GAS	F. G.	0	0	150	TANK TRK	100 GAL	17	0	5	H-P

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6090072A	DREW	MS	76/08/16	LIQ PETROLEUM GAS	F. G.	0	0	3,115	MC330	502 GAL	22	0	6	H-P
7010307A	ALTHEIMER	AR	76/12/30	LIQ PETROLEUM GAS	F. G.	0	0	10,000	MC331	4 GAL	22	0	5	H-P
5070780A	THIBODEAUX	LA	75/07/18	LIQ PETROLEUM GAS	F. G.	0	0	20,000	TANK TRL	0	17	0	1	H-P
5060519A	DANVILLE	IN	75/04/18	LIQ PETROLEUM GAS	F. G.	0	0	344	MC330	0	17	0	5	H-P
5020461A	FRAZER	PA	75/02/12	LIQ PETROLEUM GAS	F. G.	0	0	1,500	TANK TRL	0	17	0	5	H-P
5020236A	ASHTON	MD	75/02/07	LIQ PETROLEUM GAS	F. G.	0	0	500	MC331	0	2	17	5	H-P
5060030A	PAW PAW	IL	75/05/19	LIQ PETROLEUM GAS	F. G.	0	0	7	4BA	0	17	0	5	H-P
6010775A	HOT SPRINGS	SD	76/01/13	LIQ PETROLEUM GAS	F. G.	0	0	1,060	MC330	4920 GAL	22	0	5	H-P
6010649A	STILLWATER	MN	76/01/08	LIQ PETROLEUM GAS	F. G.	0	0	30	MC331	100 GAL	22	0	5	H-P
5080489A	EAGLE PASS	TX	75/04/29	LIQ PETROLEUM GAS	F. G.	15	45	100,000	TANK TRK	0	2	17	8	H-P
6030023A	COWLEY	WY	76/02/12	LIQ PETROLEUM GAS	F. G.	0	2	18,000	TANK PRT	5002 GAL	22	0	6	H-P
7020527A	WALCOTT JUNC	WY	76/11/12	LIQ PETROLEUM GAS	F. G.	0	0	0	TANK TRL	1000 GAL	22	0	6	H-P
3110303A	ORIENT	IA	73/11/10	LIQ PETROLEUM GAS	F. G.	0	0	16,390	MC331	0	2	0	6	H-P
3120098A	RUSSELL	MA	73/11/27	LIQ PETROLEUM GAS	F. G.	0	0	24	MC331	0	17	0	5	H-P
4020004A	ROSWELL	NM	73/10/31	LIQ PETROLEUM GAS	F. G.	0	0	0	TANK TRK	0	17	0	5	H-P
4020188A	ALBANY	GA	74/02/06	LIQ PETROLEUM GAS	F. G.	1	2	18,783	MC330	0	2	0	6	H-P
4020187A	ALAMOSA	CO	74/01/11	LIQ PETROLEUM GAS	F. G.	0	0	3,000	TANK TRK	0	17	0	5	H-P
4020026A	DELWAY	NC	74/01/18	LIQ PETROLEUM GAS	F. G.	0	0	1	MC331	0	17	0	5	H-P
7091091A	RICHMOND HILL	GA	77/08/23	LIQ PETROLEUM GAS	F. G.	0	0	0	TANK TRK	1 GAL	22	0	6	H-P
•7051183A	AFTON	WY	77/04/29	LIQ PETROLEUM GAS	F. G.	0	0	35,000	MC330	1000 GAL	22	0	6	H-P
8020059A	HONESDALE	PA	78/01/28	LIQ PETROLEUM GAS	F. G.	0	0	13,500	MC330	1600 GAL	22	0	5	H-P
•7051183B	AFTON	WY	77/04/29	LIQ PETROLEUM GAS	F. G.	0	0	35,000	MC330	1000 GAL	22	0	6	H-P
8120736A	MORROW	OH	78/12/02	LIQ PETROLEUM GAS	F. G.	0	0	26,000	MC330	2600 GAL	22	0	6	H-P
7110459A	GEPP	AR	77/10/28	LIQ PETROLEUM GAS	F. G.	0	0	1,000	MC311	1780 GAL	2	22	5	H-P
7110419A	HAMPSTEAD	NC	77/10/29	LIQ PETROLEUM GAS	F. G.	0	0	30,000	TANK TRK	2100 GAL	22	0	5	H-P
8061740A	PHOENIX	AZ	78/06/07	LIQ PETROLEUM GAS	F. G.	0	0	12,000	TANK TRK	1000 GAL	22	0	5	H-P
8101514A	AKRON	OH	78/10/19	TRIMETHYLAMINE ANHY	F. G.	0	0	0	4BW	1 OZS	11	22	5	H-P
3090299A	ABOLENE	TX	73/09/03	NITROGEN TETROXIDEL	POIS A	0	0	15,000	MC330	0	17	0	5	H-H
5080090A	WACO	TX	75/07/18	ARSENIC ACID LIQUID	POIS B	0	0	6,418	2E	0	17	0	5	H-P
4050618A	CROWN CITY	OH	74/03/02	CARBOLIC ACID LIQ	POIS B	0	0	0	MC304	0	17	0	5	H-H
5100041A	EMPORIA	KS	75/09/27	CARBOLIC ACID SOLID	POIS B	0	0	0	MC307	0	17	0	5	H-H
3100248A	MADISONVILLE	TX	73/09/28	COMP TR & WD KILLER	POIS B	0	0	2,000	JUG PLS	0	17	0	6	H-H
7121082A	WAKENNEY	KS	77/12/18	COMP TR & WD KILLER	POIS B	0	0	20,000	TANK TRL	1960 LBS	22	0	5	H-H
•8041189B	FRESNO	CA	78/03/30	COMP TR & WD KILLER	POIS B	0	0	0	37P	4 GAL	22	0	5	H-P
•8041189A	FRESNO	CA	78/03/30	COMP TR & WD KILLER	POIS B	0	0	0	CONT PLS	5 GAL	22	0	5	H-P
7010613C	MARSHALL CRK	PA	77/01/09	POTASSIUM CYANIDE S	POIS B	0	0	0	21C	200 LBS	22	0	5	H-P
8051244A	MEMPHIS	TN	78/05/06	SODIUM CYANIDE SOL	POIS B	0	0	100	37A	5 LBS	22	0	5	H-H
8040478A	JORDAN VALLEY	OR	78/03/10	SODIUM CYANIDE SOL	POIS B	0	0	14,000	37A	500 LBS	22	0	5	H-H
7010613A	MARSHALLS CRK	PA	77/01/09	SODIUM CYANIDE SOL	POIS B	0	0	0	37A	2400 LBS	22	0	5	H-P
•6030838A	WALLA WALLA	WA	76/02/27	DINITROPHENOL SOLUT	POIS B	0	0	1,500	17E	5 GAL	22	0	5	H-H
•6030838B	WALLA WALLA	WA	76/02/27	DINITROPHENOL SOLUT	POIS B	0	0	1,500	17C	0	22	0	5	H-H
4050240A	EFFEE	LA	74/04/22	DINITROPHENOL SOLUT	POIS B	0	0	1,520	17E	0	17	0	5	H-P
4050680A	BELZONI	MS	74/05/23	DINITROPHENOL SOLUT	POIS B	0	0	0	17E	0	2	17	5	H-P
•7070135A	YAZOO CITY	MS	77/06/22	DINITROPHENOL SOLUT	POIS B	0	0	4,500	17E	53 GAL	22	0	5	H-P
•7070135B	YAZOO CITY	MS	77/06/22	DINITROPHENOL SOLUT	POIS B	0	0	0	17E	53 GAL	22	0	5	H-P
8020044A	COLUMBUS	OH	78/01/13	INSECTICIDE DRY	POIS B	0	0	3,200	BAG PPR	14 LBS	22	0	5	H-H
8050126B	DECATUR	AL	78/04/10	INSECTICIDE DRY	POIS B	0	0	3,300	BAG PPR	60 LBS	22	0	5	H-P
7030482A	IMBODEN	AR	77/02/15	INSECTICIDE LIQUID	POIS B	0	0	300	17E	2 GAL	22	0	5	H-H
5040120A	EUFORA	MS	75/03/06	INSECTICIDE LIQUID	POIS B	0	0	0	DRUM MTL	0	3	17	5	H-P
8110312A	ROCKY POINT	NC	78/10/03	METHYL BROMIDE CHLO	POIS B	0	0	0	4BW	1500 LBS	22	0	6	H-P

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4120551A	CLEARFIELD	PA	74/12/07	METHYL BROMIDE LIQ	POIS B	0	1	1,000	4B	0	17	0	5	H-H
3070033A	SMITHS	AL	73/06/21	METHYL PARATHION L	POIS B	0	0	13,000	5B	0	2	0	5	H-P
6090278A	SUMTER	SC	76/09/01	METHYL PARATHION ML	POIS B	0	0	4,500	5B	0	3	22	5	H-P
8051272B	COLQUITT	GA	78/05/02	ORGANIC PHOSPHATE D	POIS B	0	0	3,487	BLANK	600 LBS	22	0	5	H-P
4050150A	ROPER	NC	74/04/29	ORGANIC PHOSPHATEMD	POIS B	0	0	2,500	2D	0	17	0	5	H-P
8050126C	DECATUR	AL	78/04/10	ORGANIC PHOSPHATEMD	POIS B	0	0	3,300	BAG PPR	50 LBS	22	0	5	H-P
8010973A	COLONA	IL	78/01/13	ORGANIC PHOSPHATEMD	POIS B	0	0	1,000	BOTL PLS	1080 LBS	22	0	5	H-P
8071467B	FLOMATON	AL	78/07/10	ORGANIC PHOSPHATEMD	POIS B	0	0	5,595	BAG PPR	250 LBS	22	0	5	H-P
3090322A	SUPERIOR	AZ	73/07/20	PARATHION LIQUID	POIS B	0	0	400	DRUM MTL	0	2	3	5	H-H
4050519A	LANSING	IL	74/04/24	POISONOUS LIQNOS AB	POIS B	0	0	2,440	TANK TRL	0	17	0	5	H-H
6040817A	BEAUMONT	TX	76/04/11	POISONOUS LIQNOS AB	POIS B	0	0	350	MC306	1103 GAL	22	0	5	H-H
5100689A	MUSKOGEE	OK	75/10/03	POISONOUS LIQNOS AB	POIS B	0	0	500	BOTL PLS	0	17	0	5	H-H
5010682A	TIOGA	PA	75/01/19	POISONOUS LIQNOS AB	POIS B	0	0	10	BOTL PLS	0	17	0	5	H-H
3070151A	HAYTI	MS	73/06/24	POISONOUS LIQNOS AB	POIS B	0	0	0	TANK TRL	0	17	0	5	H-H
4090250A	SUSQUEHNA TWP	PA	74/07/27	POISONOUS LIQNOS AB	POIS B	0	0	4,000	BOTL PLS	0	17	0	2	H-H
8030581A	MOREHEAD	KY	78/02/24	POISONOUS LIQ NOS B	POIS B	0	0	60	MC312	30 GAL	22	0	5	H-H
6080301A	RICHMOND	VA	76/07/26	POISONOUS LIQNOS AB	POIS B	0	0	50	37A	8 OZS	22	0	5	H-H
7040475A	AKRON	OH	77/03/29	POISONOUS LIQ NOS B	POIS B	0	0	20	17C	1 GAL	22	0	5	H-H
8010447A	TULSA	OK	77/12/29	POISONOUS LIQ NOS B	POIS B	0	0	25	BLANK	1 GAL	2	22	5	H-H
6090941A	MOUNT VERNON	IL	76/09/06	POISONOUS LIQNOS AB	POIS B	0	0	2,000	MC307	258 GAL	22	0	5	H-H
6030779A	W TERRE HAUTE	IN	76/03/06	POISONOUS SOL NOS B	POIS B	0	0	5,500	21C	1000 LBS	22	0	5	H-H
5040765A	CLEVELAND	OH	75/04/12	POISONOUS SOL N.O.S	POIS B	0	0	60,000	21C	0	2	17	5	H-H
6110027A	MILTON	PA	76/10/18	POISONOUS SOL NOS B	POIS B	0	0	0	21C	100 LBS	22	0	5	H-H
4070628A	ROGERSVILLE	TN	74/06/20	FISSILE R.A.M.	R.A.M.	0	0	4,500	DRUM MTL	0	2	17	1	H-H
4080947A	MOOREHEAD	KY	74/08/14	R.A.M. LOW SPEC ACT	R.A.M.	0	0	2,000	TANK PRT	0	17	0	1	H-H
6040286A	MIDDLETOWN	CT	76/04/05	R.A.M. LOW SPEC ACT	R.A.M.	0	0	300	TYPE B	0	22	0	1	H-H
5110279A	MORGANTOWN	WV	75/10/23	R.A.M. LOW SPEC ACT	R.A.M.	0	0	12,000	TYPE B	0	17	0	1	H-H
7101281A	SPRINGFIELD	CO	77/09/27	R.A.M. LOW SPEC ACT	R.A.M.	0	0	0	DRUM MTL	12 LBS	22	0	5	H-H
7110492A	ROCKY MTN	NC	77/11/09	R.A.M. LOW SPEC ACT	R.A.M.	0	0	0	BLANK	0	22	0	1	H-H
•5010691B	WASHINGTON	DC	75/01/22	R.A.M. N.O.S.	R.A.M.	0	0	0	17H	0	17	0	1	H-H
•5010691A	WASHINGTON	DC	75/01/22	R.A.M. N.O.S.	R.A.M.	0	0	8,500	6J	0	17	0	1	H-H
•5080654A	IDAHO FALLS	ID	75/08/09	R.A.M. N.O.S.	R.A.M.	0	0	25,000	TYPE B	0	17	0	1	H-H
•5080654F	IDAHO FALLS	ID	75/08/09	R.A.M. N.O.S.	R.A.M.	0	0	0	BLANK	0	17	0	1	H-H
•5010691D	WASHINGTON	DC	75/01/22	R.A.M. N.O.S.	R.A.M.	0	0	0	PAIL MTL	0	17	0	1	H-H
•5080654B	IDAHO FALLS	ID	75/08/09	R.A.M. N.O.S.	R.A.M.	0	0	0	DRUM MTL	0	17	0	1	H-H
•5080654C	IDAHO FALLS	ID	75/08/09	R.A.M. N.O.S.	R.A.M.	0	0	0	BLANK	0	17	0	1	H-H
4030399A	MYERSTOWN	PA	74/03/10	R.A.M. N.O.S.	R.A.M.	0	0	0	BLANK	0	17	0	1	H-H
•5010691C	WASHINGTON	DC	75/01/22	R.A.M. N.O.S.	R.A.M.	0	0	0	BOX WOOD	0	17	0	1	H-H
•5080654E	IDAHO FALLS	ID	75/08/09	R.A.M. N.O.S.	R.A.M.	0	0	0	BLANK	0	17	0	1	H-H
•5080654D	IDAHO FALLS	ID	75/08/09	R.A.M. N.O.S.	R.A.M.	0	0	0	BLANK	0	17	0	1	H-H
5010225A	BARNWELL	SC	75/01/06	R.A.M. N.O.S.	R.A.M.	0	0	5,000	BOX WOOD	0	17	0	1	H-P
3110427A	ELGIN AFB	FL	73/11/13	AMMO-CANNON EXPLO	EXPL.A.	0	0	100	BOX FBR	0	10	17	5	H-H
5010723A	COLEMAN	TX	75/01/25	AMMO-CANNON EXPLO	EXPL.A.	0	0	11,500	PALLET	0	17	0	5	H-H
4060054A	FELLOWSVILLE	WV	74/05/20	BLST CAPS >1000	EXPL.A.	0	0	600	BOX FBR	0	17	0	5	H-H
6070664B	ENFIELD	NH	76/06/10	BLST CAPS >1000	EXPL.A.	0	0	500	12H	300 LBS	2	22	5	H-P
4040202B	W FRANKFORD	IL	73/12/18	BOOSTERS EXPLOSIVES	EXPL.A.	0	0	0	12H	0	7	17	2	H-P
7010394A	WELLPINIT	WA	76/12/23	BOOSTERS EXPLOSIVES	EXPL.A.	0	0	3,132	12H	29550 LBS	22	0	5	H-P
5080001A	MANTECA	CA	75/08/13	EXPLOSIVE BOMB	EXPL.A.	0	0	12,000	BOX MTL	0	17	0	5	H-H
7090715A	RUTHERFORDTON	NC	77/08/26	EXPLOSIVE BOMB	EXPL.A.	0	0	0	TANK TRL	0	22	0	5	H-H
6050509A	O FALLON	MO	76/05/08	EXPLOSIVES CLASS A	EXPL.A.	0	0	2,000	LINR PLS	500 LBS	22	0	5	H-H

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8100857A	JOPLIN	MO	78/10/01	EXPLOSIVES CLASS A	EXPL.A.	0	0	100	LINR PLS	50 LBS	2	22	5	H-H
3110245A	SMITHFIELD	NC	73/10/29	EXPLOSIVE MINE	EXPL.A.	0	0	0	BLANK	0	17	0	1	H-H
4080176A	KNOXVILLE	TN	74/07/27	EXPLO PROJECTILE	EXPL.A.	0	0	10,000	PALLET	0	17	0	5	H-H
3100487A	SAYRE	OK	73/10/10	EXPLO PROJECTILE	EXPL.A.	0	0	0	BLANK	0	17	0	5	H-H
5110481A	NEWCOMERSTOWN	OH	75/11/10	HIGH EXPLOSIVES	EXPL.A.	0	0	675	21C	0	3	17	5	H-H
5050717A	POPLAR BLUFF	MO	75/05/12	HIGH EXPLOSIVES	EXPL.A.	0	0	6,000	LINR PLS	0	17	0	5	H-H
7040871B	AJO	AZ	76/06/25	HIGH EXPLOSIVES	EXPL.A.	0	0	7,950	BOX FBR	1600 LBS	22	0	2	H-P
7040871A	AJO	AZ	76/06/25	HIGH EXPLOSIVES	EXPL.A.	0	0	7,950	BAG PLS	10000 LBS	22	0	2	H-P
6070664A	ENFIELD	NH	76/06/10.	HIGH EXPLOSIVES	EXPL.A.	0	0	1,500	12H	3350 LBS	2	22	5	H-P
5020417A	ALTON	IL	75/02/04	PROPELLANT CLASSB S	EXPL.B.	0	0	6,000	CAN MTL	0	17	0	1	H-H
6020790A	GILA BEND	AZ	76/02/13	PROPELLANT CLASSB S	EXPL.B.	0	0	30,000	BOX MTL	0	22	0	4	H-H
3110426A	ABINGDON	VA	73/11/16	PROPELLANT CLASSB S	EXPL.B.	0	0	5,000	DRUM FBR	0	2	17	5	H-H
4070871A	HAVANA	FL	74/07/23	PROPELLANT CLASSB S	EXPL.B.	0	0	31,500	DRUM FBR	0	17	0	6	H-H
6020791A	GILA BEND	AZ	76/02/13	ROCKET MOTORS CL B	EXPL.B.	0	0	30,000	BOX WOOD	224 LBS	22	0	4	H-H
5010723D	COLEMAN	TX	75/01/25	SPECIAL FIREWORKS	EXPL.B.	0	0	0	BOX WOOD	0	17	0	1	H-H
4040202C	W FRANKFORD	IL	73/12/18	CORDEAU DETON FUSES	EXPL.C.	0	0	0	BOX FBR	0	7	17	2	H-P
7040199A	TUCSON	AZ	77/03/19	FUSE IGNITERS	EXPL.C.	0	0	1,500	MC306	3171 GAL	22	0	5	H-H
7010394B	WELLPINIT	WA	76/12/23	FUZES DETON EXPLO C	EXPL.C.	0	0	0	BOX FBR	120 LBS	22	0	5	H-P
5080749A	FT NELSON CN	ZZ	75/08/02	OIL WELL CARTRIDGES	EXPL.C.	0	0	1,500	12B	0	17	0	5	H-H
3080237A	ROCHESTER	NY	73/07/30	SMALL-ARMS AMMO	EXPL.C.	0	0	0	BOX FBR	0	17	0	5	H-H
3090388A	CHENOA	IL	73/09/04	SMALL-ARMS AMMO	EXPL.C.	0	0	38,000	BOX FBR	0	17	0	5	H-H
6070767A	CAPE GIRARDEU	MO	76/05/06	SMALL-ARMS AMMO	EXPL.C.	0	0	50	BOX FBR	125 LBS	22	0	5	H-H
5080725A	BLACKFOOT	ID	75/08/18	ACETIC ACID GLACIAL	COR	0	0	80	JUG GLS	0	17	0	5	H-H
6010424A	PRINCETON	KY	76/01/05	ACETIC ACID GLACIAL	COR	0	0	0	MC307	20 GAL	22	0	5	H-H
8100489A	ROCK HILL	NC	78/08/30	ACETIC ANHYDRIDE	COR	0	0	500	MC306	2660 LBS	22	0	5	H-H
5110038A	DALLAS	TX	75/10/25	ACID LIQUID N.O.S.	COR	0	0	3,516	LINR PLS	0	17	0	5	H-H
7051133A	LA GRANGE	IL	77/05/16	ACID LIQUID N.O.S.	COR	1	0	0	MC306	4000 GAL	2	22	6	H-H
8050040A	DALLAS	TX	78/04/16	ACID LIQUID N.O.S.	COR	0	0	0	CONT PLS	200 GAL	24	0	5	H-H
7070737H	ATLANTA	GA	77/06/29	ACID LIQUID N.O.S.	COR	0	0	0	BOTL PLS	40 GAL	22	0	5	H-H
4020338A	CHICAGO	IL	74/02/12	ACID LIQUID N.O.S.	COR	0	0	0	TANK TRL	0	8	0	5	H-P
4110699A	HANNA	WY	74/11/10	ALKA CAUST LIQ NOS	COR	0	0	1,200	2U	0	17	0	5	H-H
5100784A	BRISTOL	TN	75/10/10	ALKA CAUST LIQ NOS	COR	0	0	50	17E	0	17	0	5	H-H
•7070737K	ATLANTA	GA	77/06/29	ALKALINE LIQUID NOS	COR	0	0	0	34	240 GAL	22	0	5	H-H
•7070737D	ATLANTA	GA	77/06/29	ALKALINE LIQUID NOS	COR	0	0	0	2U	80 GAL	22	0	5	H-H
•7070737N	ATLANTA	GA	77/06/29	ALKALINE LIQUID NOS	COR	0	0	0	2U	135 GAL	22	0	5	H-H
8040858A	BUFFALO	TX	78/04/04	ALKA COR LIQ N.O.S.	COR	0	0	500	17E	55 GAL	22	0	5	H-H
7041012A	DEMOTTE	IN	77/04/14	ALUMINUM PHOS SLN	COR	0	0	25	TANK TRK	6 GAL	22	0	5	H-P
8030377H	SANTA ANA	CA	78/02/22	AMMON HYDROXIDE <45	COR	0	0	1,386	BOTL GLS	209 GAL	22	0	5	H-H
3070203A	ALLENTOWN	PA	73/06/22	BATTS STORAGE WET	COR	0	0	500	CAN MTL	0	17	0	5	H-H
•4110477A	SPRINGFIELD	IL	74/07/23	BATTS STORAGE WET	COR	0	0	400	PALLET	0	17	0	5	H-H
4100707A	ATLANTA	GA	74/10/07	BATTS STORAGE WET	COR	0	0	0	PALLET	0	17	0	5	H-H
4070491A	OMAHA	NE	74/06/26	BATTS STORAGE WET	COR	0	0	100	PALLET	0	17	0	5	H-H
•4110476A	SPRINGFIELD	IL	74/07/23	BATTS STORAGE WET	COR	0	0	65	PALLET	0	17	0	5	H-H
•4020396A	BLADENSBURG	MD	74/02/14	BATTS STORAGE WET	COR	0	0	1,800	BOX FBR	0	17	0	5	H-H
6030505A	LIMON	CO	76/03/09	BATTS STORAGE WET	COR	0	0	40	BOX FBR	1 GAL	22	0	5	H-H
4010361A	STOCKTON	CA	74/01/08	BATTS STORAGE WET	COR	0	0	6,500	PALLET	0	17	0	5	H-H
4050097A	MILESBURG	PA	74/04/30	BATTS STORAGE WET	COR	0	0	8,000	BOX WOOD	0	17	0	5	H-H
•4020103A	BLADENSBURG	MD	74/02/14	BATTS STORAGE WET	COR	0	0	3,500	BOX FBR	0	1	0	5	H-H
5030378A	LARAMIE	WY	75/03/05	BATTS STORAGE WET	COR	0	0	150	12D	0	17	0	5	H-H
6070879A	W MIDDLESEX	PA	76/07/04	BATTS STORAGE WET	COR	0	0	25	PALLET	0 OZS	22	0	5	H-H

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REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD		FAILURES		R	MODE
7010601A	DETROIT	MI	77/01/10	BATTS STORAGE WET	COR	0	0	0	BLANK	2	QTS	22	0	5	H-H
8091188Y	OMAHA	NE	78/08/21	BATTS STORAGE WET	COR	0	0	0		1	QTS	0	0	1	H-H
4010383B	HAZLETON	PA	74/01/29	BATTS STORAGE WET	COR	0	0	0	BOX FBR	0		17	0	5	H-P
3120238A	HUSTONTOWN	PA	73/09/05	BATTS STORAGE WET	COR	0	0	5,949	BOX FBR	0		17	0	5	H-P
7030850A	CLINTON	OK	74/08/05	BATTS STORAGE WET	COR	0	0	4,050	BOX FBR	225	GAL	22	0	5	H-P
5080984A	PARAGON	IN	75/08/25	BATTS STORAGE WET	COR	0	0	0	BOX WOOD	0		17	0	5	H-P
8031216X	MERCER	PA	78/03/13	BATTS STORAGE WET	COR	0	0	0		64	GAL	0	0	5	H-P
3070335A	PAYSON	AZ	73/06/13	BATTS W/AUTOS	COR	0	0	7,500	BLANK	0		0	0	5	H-P
7110633A	INDIANAPOLIS	IN	77/11/11	BOILER COMP LIQ	COR	0	0	100	PAIL PLS	30	GAL	22	0	5	H-H
8030776A	FORT WAYNE	IN	78/03/07	BOILER COMP LIQ	COR	0	0	30	17E	1	GAL	2	22	5	H-H
7080461A	BUTLER	PA	77/07/19	BOILER COMP LIQ	COR	0	0	4,000	DRUM MTL	55	GAL	22	0	5	H-H
7071053A	ROCKWOOD	TN	77/07/12	BROMINE	COR	0	101	150,000	MC312	1000	GAL	22	0	5	H-H
5100397A	ANASASA	IA	75/09/25	CAUSTIC POTASH LIQ	COR	0	0	33	CAN MTL	0		17	0	5	H-H
5010167A	COLDWATER	MI	74/12/31	CAUSTIC SODA DRY	COR	0	3	0	DRUM MTL	0		2	17	5	H-H
5070799A	JEFFERSONVL	OH	75/07/16	CAUSTIC SODA DRY	COR	0	0	200	LINR PLS	0		17	0	5	H-H
6070941A	KANSAS CITY	MO	76/06/21	CAUSTIC SODA DRY	COR	0	0	40	DRUM MTL	100	LBS	22	0	5	H-H
6061174A	PRAIRIE VIEW	TX	76/06/07	CAUSTIC SODA DRY	COR	0	1	250	BAG PLS	5	PTS	22	0	5	H-H
6040800A	NEWINGTON	CT	76/03/30	CAUSTIC SODA LIQUID	COR	0	0	500	MC307	130	GAL	11	23	5	H-H
6020087A	ARTHUR	TX	76/01/06	CAUSTIC SODA LIQUID	COR	0	0	23,000	MC311	25	GAL	22	0	5	H-H
4040100A	SIDNEY	ME	74/03/24	CAUSTIC SODA LIQUID	COR	0	0	74	TANK TRL	0		2	0	5	H-H
4010074A	PARAGONAH	UT	73/12/15	CAUSTIC SODA LIQUID	COR	0	0	9,000	MC311	0		17	0	5	H-H
4030276A	COKEVILLE	WY	74/03/13	CAUSTIC SODA LIQUID	COR	0	0	10,500	MC311	0		17	0	5	H-H
5010438A	ARVADA	CO	74/07/26	CAUSTIC SODA LIQUID	COR	0	0	1,188	MC312	0		17	0	5	H-H
5050344A	FORT WAYNE	IN	75/04/24	CAUSTIC SODA LIQUID	COR	0	0	5,000	MC304	0		17	0	5	H-H
5010180A	PINEHURST	ID	74/12/30	CAUSTIC SODA LIQUID	COR	0	0	5	MC311	0		17	0	5	H-H
6020429A	LUDOWICI	GA	76/01/28	CAUSTIC SODA LIQUID	COR	0	0	0	MC312	150	GAL	22	0	5	H-H
5070734A	VERONA	KY	75/07/13	CAUSTIC SODA LIQUID	COR	0	0	20,000	MC312	0		17	0	5	H-H
6040432A	FORT WORTH	TX	76/03/17	CAUSTIC SODA LIQUID	COR	0	0	200	MC304	20	GAL	22	0	5	H-H
7020041A	COLLINSVILLE	VA	76/12/27	COAL TAR DYE LIQ	COR	0	0	0	MC307	6697	GAL	2	22	5	H-H
5080650A	TONAPH	AZ	75/07/01	COMP CLEANING LIQ C	COR	0	0	0	DRUM MTL	0		3	17	5	H-H
4100224A	WAYNESBORO	TN	74/09/27	COMP CLEANING LIQ C	COR	0	0	7,000	DRUM MTL	0		17	0	5	H-H
4030177A	ROCHESTER	NY	74/02/21	COMP CLEANING LIQ C	COR	0	0	500	DRUM PLS	0		2	3	5	H-H
4010169A	HARDY	AR	74/01/03	COMP CLEANING LIQ C	COR	0	0	1,500	BOTL	0		17	0	5	H-H
5020280A	NEW YORK	NY	75/01/21	COMP CLEANING LIQ C	COR	0	0	25,000	2SL	0		17	0	5	H-H
8020190A	CINCINNATI	OH	78/01/14	COMP CLEANING LIQ C	COR	0	0	50	CAN MTL	1	GAL	22	0	5	H-H
7040045A	ESSEX	IA	77/03/21	COMP CLEANING LIQ C	COR	0	0	50	PAIL	10	GAL	3	22	5	H-H
6070140A	ST PETERSBURG	PA	76/06/09	COMP CLEANING LIQ C	COR	0	0	20	34	10	GAL	2	22	5	H-H
8050336A	BARSTOW	CA	78/04/24	COMP CLEANING LIQ C	COR	0	0	35	BOTL GLS	2	GAL	22	0	5	H-H
7110015A	JASPER	AL	77/10/25	COMP CLEANING LIQ C	COR	0	0	400	17E	55	GAL	22	0	5	H-H
8050353A	DWIGHT	IL	78/04/13	COMP CLEANING LIQ C	COR	0	0	325	DRUM PLS	58	GAL	22	0	5	H-H
8010448A	TULSA	OK	77/12/29	COMP CLEANING LIQ C	COR	0	0	25	DRUM MTL	1	GAL	2	22	5	H-H
7070737D	ATLANTA	GA	77/06/29	COMP CLEANING LIQ C	COR	0	0	0	BOTL PLS	24	GAL	22	0	5	H-H
8080325A	DELAWARE CITY	IN	78/07/07	COMP CLEANING LIQ C	COR	0	0	125	DRUM	20	GAL	22	0	2	H-H
8090168A	KANSAS CITY	MO	78/08/17	COMP CLEANING LIQ C	COR	0	0	500	CONT PLS	231	LBS	22	0	5	H-H
8110759A	MANKATO	MN	78/11/07	COMP CLEANING LIQ C	COR	0	0	200	JUG PLS	20	GAL	22	0	5	H-H
8071202A	PENNSAUKEN	NJ	78/07/18	COMP CLEANING LIQ C	COR	0	0	1,000	TANK PRT	300	GAL	1	0	5	H-H
8101382A	LOUISVILLE	KY	78/10/13	COMP CLEANING LIQ C	COR	0	0	0	LINR PLS	2	GAL	2	0	5	H-H
7060805A	DANVILLE	IL	77/06/07	COMP CLEANING LIQ C	COR	0	0	200	TANK TRL	40	GAL	22	0	5	H-P
8010265A	LOUISVILLE	KY	77/12/23	COMP CLEANING LIQ C	COR	0	0	475	MC307	287	GAL	2	22	5	H-P
7070737C	ATLANTA	GA	77/06/29	COMP CL LIQ W/HCL	COR	0	0	0	BOTL PLS	48	QTS	22	0	5	H-H

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REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
7070948A	SEATTLE	WA	77/06/27	COMP CL LIQ W/HFL	COR	0	0	40	FAIL PLS	4 GAL	1	0	5	H-H
3100186A	CAMP HILL	PA	73/08/22	COMP RUST REMOVER	COR	0	0	5	DRUM MTL	0	11	0	5	H-H
6080372A	ROANOKE	IN	76/08/02	COMP RUST REMOVER	COR	0	0	500	2S	110 GAL	22	0	5	H-H
8110599A	BAKER	CA	78/10/30	COMP RUST REMOVER	COR	0	0	2,000	2SL	1100 GAL	22	0	2	H-H
5090633A	KEOKUK	IA	75/09/11	CORR LIQ N.O.S.	COR	0	0	50	2U	0	17	0	5	H-H
5100396A	ANASASA	IA	75/09/25	CORR LIQ N.O.S.	COR	0	0	50	2SL	0	17	0	5	H-H
5101096A	CARTERET	NJ	75/10/22	CORR LIQ N.O.S.	COR	0	0	850	TANK TRL	0	2	0	5	H-H
4070726A	BULLS GAP	TN	74/07/14	CORR LIQ N.O.S.	COR	0	0	7,000	MC304	0	17	0	5	H-H
4090347A	TYRONE	PA	74/08/22	CORR LIQ N.O.S.	COR	0	0	0	2U	0	17	0	5	H-H
6020586A	WINNIE	TX	76/01/26	CORR LIQ N.O.S.	COR	0	0	30	CARBOY G	5 GAL	2	22	5	H-H
8040918B	VERO BEACH	FL	78/03/03	CORR LIQ N.O.S.	COR	0	0	0	2T	130 GAL	22	0	5	H-H
7010306A	MILESBURG	PA	76/12/21	CORR LIQ N.O.S.	COR	0	0	0	JUG PLS	8 OZS	11	22	5	H-H
8060464A	NEWBURG	NC	78/05/19	CORR LIQ N.O.S.	COR	0	0	1,956	MC304	532 GAL	22	0	5	H-H
8030460A	PIGEON	MI	78/02/27	CORR LIQ N.O.S.	COR	0	0	6,000	MC305	200 GAL	22	0	5	H-H
8050667A	JACKSON	MI	78/04/28	CORR LIQ N.O.S.	COR	0	0	5,000	CONT PLS	55 GAL	2	0	5	H-H
8050781A	FREMONT	MO	78/05/03	CORR LIQ N.O.S.	COR	0	0	0	17E	25 GAL	22	0	5	H-H
7030211A	BROOKLYN	IA	77/02/14	CORR LIQ N.O.S.	COR	0	0	1,573	17E	220 GAL	22	0	5	H-H
7030706A	LANETT	AL	77/03/02	CORR LIQ N.O.S.	COR	0	0	40,000	MC306	3500 GAL	2	22	5	H-H
6120292A	FREMONT	OH	76/11/23	CORR LIQ N.O.S.	COR	0	0	150	BLANK	60 GAL	22	0	5	H-H
7070686A	HELMS	CA	77/07/05	CORR LIQ N.O.S.	COR	0	0	0	TANK TRK	1700 GAL	22	0	5	H-H
7100838A	RIPLEY	NY	77/10/11	CORR LIQ N.O.S.	COR	0	0	2,000	JUG PLS	10 GAL	22	0	5	H-H
7040049A	BUCHANAN	VA	77/03/18	CORR LIQ N.O.S.	COR	0	0	0	DRUM MTL	1 GAL	22	0	5	H-H
8021005A	BOLIVAR	TN	78/02/08	CORR LIQ N.O.S.	COR	0	0	5,800	MC307	10 GAL	22	0	5	H-H
7060051A	CARTERET	NJ	77/05/19	CORR LIQ N.O.S.	COR	0	0	0	MC306	500 GAL	22	0	5	H-H
8051365A	DORAVILLE	GA	78/05/05	CORR LIQ N.O.S.	COR	0	0	0	17E	20 GAL	2	22	5	H-H
7051485B	ANDERSON	IN	77/05/10	CORR LIQ N.O.S.	COR	0	0	0	JUG GLS	8 GAL	22	0	5	H-H
7051485A	ANDERSON	IN	77/05/10	CORR LIQ N.O.S.	COR	0	0	3,000	17E	30 GAL	22	0	5	H-H
•8061203B	BROOKLYN	IA	78/06/07	CORR LIQ N.O.S.	COR	0	0	0	34	5 GAL	22	0	5	H-H
•8061203A	BROOKLYN	IA	78/06/07	CORR LIQ N.O.S.	COR	0	0	0	37M	5 GAL	22	0	5	H-H
8100382A	SPRING	TX	78/09/29	CORR LIQ N.O.S.	COR	0	0	50	BOTL PLS	2 QTS	22	0	5	H-H
8120145A	DUNCAN	SC	78/10/25	CORR LIQ N.O.S.	COR	0	0	25	CONT PLS	2 GAL	22	0	5	H-H
4040167A	CROWLEY	LA	74/03/21	CORR LIQ N.O.S.	COR	0	0	500	17E	0	2	17	5	H-P
6070696A	PHILADELPHIA	PA	76/07/08	CORR LIQ N.O.S.	COR	0	0	0	57	4000 GAL	22	0	5	H-P
8081101A	WATERBURY	CT	78/08/10	CORR LIQ N.O.S.	COR	0	0	0	MC330	566 GAL	22	0	5	H-P
8101183A	DIXON	IL	78/10/09	CORR LIQ N.O.S.	COR	0	0	5,000	TANK TRK	500 GAL	22	0	5	H-P
7080452A	TELLURIDE	CO	77/07/15	CORR LIQ N.O.S.	COR	0	0	0	MC312	2400 GAL	22	0	5	H-P
7100112A	TANGIPAHOA	LA	75/11/14	CORR LIQ N.O.S.	COR	0	0	0	MC307	5 GAL	22	0	5	H-P
7111014A	SANTO	TX	77/11/17	CORR LIQ N.O.S.	COR	0	0	25,000	MC307	3800 GAL	22	0	5	H-P
8090326A	ANDREWS	TX	78/08/18	CORR LIQ N.O.S.	COR	0	0	500	TANK TRK	500 GAL	22	0	5	H-P
5090814A	SAN PABLO	CA	75/09/11	CORR SOLID N.O.S.	COR	0	0	1,000	DRUM MTL	0	11	0	5	H-H
4100224B	WAYNESBORO	TN	74/09/27	CORR SOLID N.O.S.	COR	0	0	0	DRUM FBR	0	17	0	5	H-H
8040564B	SUMMIT	IL	78/03/19	CORR SOLID N.O.S.	COR	0	0	250	KEG WOOD	562 LBS	22	0	6	H-H
•7070737A	ATLANTA	GA	77/06/29	CORR SOLID N.O.S.	COR	0	12	38,000	FAIL PLS	80 GAL	22	0	5	H-H
•7070737E	ATLANTA	GA	77/06/29	CORR SOLID N.O.S.	COR	0	0	0	BAG PPR	3600 LBS	22	0	5	H-H
•7070737L	ATLANTA	GA	77/06/29	CORR SOLID N.O.S.	COR	0	0	0	LINR PLS	400 LBS	22	0	5	H-H
6081181A	PASCO	WA	76/08/13	CORR SOLID N.O.S.	COR	0	3	18,744	DRUM MTL	2750 GAL	22	0	5	H-P
6020310A	BUFFALO	NY	76/01/23	DRUGS CHEMICALS COR	COR	0	0	0	2U	1 GAL	22	0	5	H-H
4040359A	BURGAW	NC	74/04/06	ELECTR BATT FL	COR	0	0	60	BAG PLS	0	17	0	5	H-H
•7030355B	SHADWELL	VA	77/02/28	ELECTR BATT FL	COR	0	0	0	LINR PLS	57 GAL	22	0	5	H-H
•7030355C	SHADWELL	VA	77/02/28	ELECTR BATT FL	COR	0	0	0	LINR PLS	58 GAL	22	0	5	H-H

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•7030355D	SHADWELL	VA	77/02/28	ELECTR BATT FL	COR	0	0	0	LINR PLS	45 GAL	22	0	5	H-H
•7030355E	SHADWELL	VA	77/02/28	ELECTR BATT FL	COR	0	0	0	LINR PLS	57 GAL	22	0	5	H-H
8050108Y	FOREST CITY	IA	77/11/08	ELECTR BATT FL	COR	0	0	94		3 PTS	0	0	5	H-H
8050109Y	SIOUX CITY	IA	78/03/15	ELECTR BATT FL	COR	0	0	76		3 PTS	0	0	5	H-H
8050110Y	ROCKWELL CITY	IA	78/02/01	ELECTR BATT FL	COR	0	0	83		2 PTS	0	0	5	H-H
•7030355A	SHADWELL	VA	77/02/28	ELECTR BATT FL	COR	0	0	1,200	LINR PLS	57 GAL	22	0	5	H-H
8061185Y	ORLANDO	FL	78/06/08	ELECTR BATT FL	COR	0	0	50		2 PTS	0	0	1	H-H
8080706A	BRIDGEPORT	OH	78/07/27	ELECTR BATT FL	COR	0	0	10,000	LINR PLS	20000 LBS	22	0	5	H-H
4010383A	HAZLETON	PA	74/01/29	ELECTR BATT FL	COR	0	0	1,550	LINR PLS	0	17	0	5	H-P
5030138A	IVOR	VA	75/02/19	ELECTR BATT FL	COR	0	0	781	LINR PLS	0	17	0	5	H-P
5020085A	ZAVALLA	TX	75/01/27	ELECTR BATT FL	COR	0	0	50	LINR PLS	0	17	0	5	H-P
8020027A	N BERGEN	NJ	78/01/25	ELECTR BATT FL	COR	0	0	9,018	LINR PLS	25 GAL	22	0	5	H-P
7020307A	PHOENIX	AZ	77/01/26	FLUOBORIC ACID	COR	0	0	250	2U	15 GAL	22	0	5	H-H
7071446A	DECATUR	AL	77/07/13	HEXAMETHYLENE DIA S	COR	0	0	500	TANK TRL	2000 GAL	22	0	5	H-H
6120305A	MAUPIN JCT	OR	76/07/17	HYDRIODIC ACID	COR	0	0	4,100	TANK TRK	1728 GAL	22	0	5	H-P
5090363A	ORLANDO	FL	75/08/28	HYDROCHLORIC ACID	COR	0	0	100	CARBOY G	0	17	0	5	H-H
5080470A	FRIENDSHIP	OH	75/08/07	HYDROCHLORIC ACID	COR	0	0	5,000	TANK TRL	0	17	0	5	H-H
3100166A	BOSWELL	IN	73/09/21	HYDROCHLORIC ACID	COR	0	7	5,000	MC311	0	8	14	8	H-H
3120178A	LAS VEGAS	NV	73/12/05	HYDROCHLORIC ACID	COR	0	0	30,000	MC311	0	17	0	5	H-H
4100254A	OAKLEY	CA	74/09/22	HYDROCHLORIC ACID	COR	0	0	15,000	MC311	0	17	0	5	H-H
5030762A	WIERTON	WV	75/03/20	HYDROCHLORIC ACID	COR	0	0	7,700	MC311	0	17	0	5	H-H
4020123A	MONTICELLO	IL	74/01/28	HYDROCHLORIC ACID	COR	0	0	29,000	MC312	0	17	0	5	H-H
8010303A	COLUMBUS	OH	77/12/14	HYDROCHLORIC ACID	COR	0	0	400	MC311	8140 LBS	22	0	5	H-H
7020194A	AUGUSTA	GA	77/01/26	HYDROCHLORIC ACID	COR	0	0	200	MC312	2500 GAL	22	0	5	H-H
8010696A	CLEVELAND	TN	77/12/09	HYDROCHLORIC ACID	COR	0	0	200	MC312	261 GAL	22	0	5	H-H
7100839A	CRESCENT CITY	IL	77/10/10	HYDROCHLORIC ACID	COR	0	0	40,000	MC312	3000 GAL	2	22	5	H-H
6090666A	TOPEKA	KS	76/09/07	HYDROCHLORIC ACID	COR	0	0	15	MC312	3 GAL	22	0	5	H-H
8011154A	WATERVILLE	ME	78/01/10	HYDROCHLORIC ACID	COR	0	0	500	MC312	2000 GAL	22	0	5	H-H
6030045A	ATOKA	TN	76/02/19	HYDROCHLORIC ACID	COR	0	0	77	JUG PLS	2 GAL	3	22	5	H-P
5020423A	PLATTVILLE	CO	75/02/03	HYDROCHLORIC ACID	COR	0	0	100,100	TANK TRK	0	11	0	5	H-P
6120466A	GRAHAM	TX	76/12/06	HYDROCHLORIC ACID	COR	0	0	200	TANK TRL	400 GAL	22	0	5	H-P
7041001A	WORLAND	WY	77/04/19	HYDROCHLORIC ACID	COR	0	0	10,000	TANK TRL	500 GAL	22	0	5	H-P
3110421A	LONGWORTH	TX	73/11/09	HYDROCHLORIC ACID	COR	0	0	2,000	TANK TRL	0	2	0	5	H-P
•5100839A	SCARBOROUGH	ME	75/10/20	HYDROCHLORIC ACID	COR	0	0	125	34	0	2	0	5	H-P
•5100839B	SCARBOROUGH	ME	75/10/20	HYDROCHLORIC ACID	COR	0	0	375	34	0	2	0	5	H-P
7041000A	KINGFISHER	OK	77/04/16	HYDROCHLORIC ACID	COR	0	0	400	TANK TRL	3150 GAL	22	0	5	H-P
6060402A	WICHITA	KS	76/06/02	HYDROCHLORIC ACID	COR	0	0	6,000	MC311	100 GAL	22	0	5	H-P
6060484A	MINDEN	LA	76/05/25	HYDROCHLORIC ACID	COR	0	0	500	2SL	110 GAL	22	0	5	H-P
7010067A	ANDREWS	TX	76/12/15	HYDROCHLORIC ACID	COR	0	0	0	TANK TRK	4500 GAL	22	0	5	H-P
6080635A	PLANT CITY	FL	76/07/29	HYDROCHLORIC ACID	COR	0	0	9,200	BLANK	3 GAL	22	0	5	H-P
7120069A	HOURD	TX	77/09/27	HYDROCHLORIC ACID	COR	0	0	0	TANK TRL	750 GAL	2	22	5	H-P
8090894A	KINGFISHER	OK	78/09/03	HYDROCHLORIC ACID	COR	0	0	0	TANK TRL	4000 GAL	22	0	5	H-P
7101413A	LUFKIN	TX	77/10/20	HYDROCHLORIC ACID	COR	0	0	0	TANK TRL	2000 GAL	22	0	5	H-P
7100726A	HOURD	TX	77/09/27	HYDROCHLORIC ACID	COR	0	0	0	TANK TRL	750 GAL	22	0	5	H-P
8020391A	EASTLAND	TX	78/01/30	HYDROCHLORIC ACID	COR	0	0	150	TANK TRL	3000 GAL	22	0	5	H-P
8030998A	STANTON	TX	78/03/08	HYDROCHLORIC ACID	COR	0	0	22,000	MC312	4000 GAL	22	0	5	H-P
7050973A	LOCO HILLS	NM	77/05/12	HYDROCHLORIC ACID	COR	0	0	0	MC312	2000 GAL	22	0	5	H-P
6070456A	NEWBERRY	IN	76/06/28	HCL MIXTURES	COR	0	0	1,350	TANK TRL	500 GAL	22	0	5	H-P
4100025A	BOSSIER CITY	LA	74/09/21	HCL SOLUTION	COR	0	0	900	TANK TRL	0	15	0	5	H-P
7100061A	HIHARA	GA	77/09/14	HYDROFLUORIC AC SLN	COR	0	0	500	DRUM PLS	55 GAL	22	0	5	H-H

RECORDS ARE SORTED BY CLASS AND COMMODITY CODES

INCIDENTS INVOLVING VEHICULAR ACCIDENTS DURING JULY 1973 THRU DECEMBER 1978

REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
8061743A	EFFINGHAM	IL	78/06/19	HYDROFLUOSILIC ACID	COR	0	0	75	DRUM PLS	55 GAL	22	0	5	H-P
3080498A	DES MOINES	IA	73/08/13	HYDROGEN PEROXIDE	COR	0	0	6,500	2SL	0	2	3	6	H-H
4110699B	HANNA	WY	74/11/10	HYPOCHLORITE SOL	COR	0	0	0	BOTL PLS	0	17	0	5	H-H
•7070737I	ATLANTA	GA	77/06/29	HYPOCHLORITE SOL	COR	0	0	0	BOTL PLS	16 GAL	22	0	5	H-H
6091076A	GREENBROOK	NJ	76/09/23	HYPOCHLORITE SOL	COR	0	0	0	34	18 GAL	22	0	5	H-H
•7070737J	ATLANTA	GA	77/06/29	HYPOCHLORITE SOL	COR	0	0	0	BOTL PLS	96 GAL	22	0	5	H-H
6081017A	WESTHOFF	TX	76/07/01	MONOETHANOLAMINE	COR	0	0	10,000	TANK TRL	450 GAL	22	0	5	H-H
5050683A	HOUSTON	TX	75/05/02	NITRIC ACID	COR	0	2	0	MC312	0	17	0	5	H-H
4110298A	REISTERSTOWN	MD	74/10/25	NITRIC ACID	COR	0	1	22,000	MC311	0	2	17	5	H-H
7081039A	ESTILL	SC	77/08/04	NITRIC ACID	COR	0	0	3,000	MC312	7920 LBS	22	0	5	H-H
8010672A	GORMAN	CA	78/01/12	NITRIC ACID	COR	0	0	8,000	MC311	10 GAL	22	0	5	H-H
6100404A	LOUISVILLE	KY	76/09/27	NITRIC ACID	COR	0	0	9,000	MC312	1398 GAL	22	0	5	H-H
3110166B	PALMENTO	FL	73/10/30	NITRIC ACID	COR	0	0	3,400	DRUM PLS	0	3	0	6	H-P
5040744A	W POINT	VA	75/04/18	PHOSPHORIC ACID	COR	0	0	1,000	MC307	0	17	0	5	H-H
5020430A	KANSAS CITY	MO	75/01/15	PHOSPHORIC ACID	COR	0	0	50	BLANK	0	7	17	6	H-H
5010588A	FORT LONESOME	FL	75/01/21	PHOSPHORIC ACID	COR	0	0	15	MC312	0	11	17	5	H-H
4100123A	BONNIE	FL	74/09/23	PHOSPHORIC ACID	COR	0	0	200	MC304	0	17	0	5	H-H
7070879A	BALM	FL	77/07/07	PHOSPHORIC ACID	COR	0	0	0	MC307	1750 GAL	22	0	5	H-H
7050407A	WIMAUMA	FL	77/05/02	PHOSPHORIC ACID	COR	0	0	50	MC304	50 GAL	19	22	5	H-H
8051235A	SHARONVILLE	OH	78/03/28	PHOSPHORIC ACID	COR	0	0	100	MC304	25 GAL	22	0	5	H-H
8070417A	CORCORAN	CA	78/06/21	PHOSPHORIC ACID	COR	0	0	28,000	TANK TRL	500 GAL	22	0	5	H-H
8091105A	KINGSVILLE	OH	78/08/25	PHOSPHORUS TRICL2	COR	0	43	30,000	MC312	32010 LBS	22	0	5	H-H
7030209A	BROOKLYN	IA	77/02/04	POTASS HYDROXIDE LQ	COR	0	0	83	34	12 GAL	22	0	5	H-H
7010613B	MARSHALL CRK	PA	77/01/09	POTASS HYDROXIDE DR	COR	0	0	0	DRUM MTL	200 LBS	22	0	5	H-P
8090675A	BEAN STATION	TN	78/08/21	PROPIONIC ACID	COR	0	0	20,000	MC307	4200 GAL	22	0	5	H-H
8030710A	WAYNESVILLE	MO	78/02/23	SILICON CHLORIDE	COR	0	3	25,000	MC312	2234 LBS	22	0	5	H-H
8061743B	EFFINGHAM	IL	78/06/19	SODIUM CHLORITE<43S	COR	0	0	75	DRUM PLS	55 GAL	22	0	5	H-P
7010201A	LAMAR	MO	76/12/16	SODIUM HYDROXID DRY	COR	0	0	0	DRUM MTL	1155 GAL	22	0	5	H-H
7091439A	CENTERVILLE	TX	77/09/17	SODIUM HYDROXIDE LQ	COR	0	0	1,800	TANK TRL	44570 LBS	22	0	5	H-H
7010734A	PLAQUEMINE	LA	77/01/19	SODIUM HYDROXIDE LQ	COR	0	0	12	MC307	25 GAL	22	0	5	H-H
6080551A	BATTLE CREEK	MI	76/08/06	SODIUM HYDROXIDE LQ	COR	0	20	35,000	MC312	500 GAL	22	0	5	H-H
8040552A	FORT NECHES	TX	78/03/27	SODIUM HYDROXIDE LQ	COR	0	0	1,500	MC307	39000 LBS	22	0	5	H-H
•8040918C	VERO BEACH	FL	78/03/03	SODIUM HYDROXIDE LQ	COR	0	0	0	DRUM PLS	100 GAL	22	0	5	H-H
8040933A	HOUSTON	TX	78/02/27	SODIUM HYDROXIDE LQ	COR	0	0	2,000	MC304	1750 GAL	22	0	5	H-H
7050279A	LAS VEGAS	NV	77/04/29	SODIUM HYDROXIDE LQ	COR	0	0	500	TANK TRL	722 GAL	22	0	5	H-H
7060168A	BATESVILLE	IN	77/05/20	SODIUM HYDROXIDE LQ	COR	0	0	1,500	MC304	501 GAL	22	0	5	H-H
•8040918A	VERO BEACH	FL	78/03/03	SODIUM HYDROXIDE LQ	COR	0	0	16,000	BOTL PLS	12 GAL	22	0	5	H-H
•6120733B	LA SAL JCT	UT	76/12/17	SODIUM HYDROXIDE LQ	COR	0	0	750	MC311	1024 GAL	22	0	5	H-H
•6120733A	LA SAL JCT	UT	76/12/17	SODIUM HYDROXIDE LQ	COR	0	0	750	MC311	1025 GAL	2	22	5	H-H
8100481A	GRAFTON	WV	78/08/11	SODIUM HYDROXIDE LQ	COR	0	0	500	MC307	4000 LBS	22	0	5	H-H
8080836A	PINOLE	CA	78/08/04	SODIUM HYDROXIDE LQ	COR	0	1	5,000	TANK TRK	2670 GAL	22	0	6	H-H
8120769A	PHILADELPHIA	PA	78/12/16	SODIUM HYDROXIDE LQ	COR	0	0	2,500	17E	100 GAL	2	22	5	H-P
7070532A	ST LOUIS	MO	77/07/01	SODIUM HYDROXIDE LQ	COR	0	0	0	MC312	3400 GAL	2	22	1	H-P
8040472A	MOKENA	IL	78/03/29	SULFURIC ACID SPENT	COR	0	0	17,000	MC312	12 GAL	22	0	5	H-H
4090167A	WARM SPRINGS	GA	74/08/14	SULFURIC ACID FUMIN	COR	0	0	6,500	MC312	0	2	17	5	H-H
4090503A	CHEYENNE	WY	74/07/13	SULFURIC ACID FUMIN	COR	0	0	0	BOTL GLS	0	17	0	5	H-H
3070613A	WINKLEMAN	AZ	73/07/06	SULFURIC ACID FUMIN	COR	0	0	500	MC311	0	2	0	5	H-H
3110380A	MAMMOTH	AZ	73/11/19	SULFURIC ACID FUMIN	COR	0	0	600	MC311	0	2	0	5	H-H
3110375A	RODEO	CA	73/11/15	SULFURIC ACID FUMIN	COR	0	0	500	MC312	0	17	0	5	H-H
3110374A	HELM	CA	73/11/18	SULFURIC ACID FUMIN	COR	0	0	2,000	TANK TRL	0	17	0	5	H-H

RECORDS ARE SORTED BY CLASS AND COMMODITY CODES

INCIDENTS INVOLVING VEHICULAR ACCIDENTS DURING JULY 1973 THRU DECEMBER 1978

REPORT NO	INCIDENT LOCATION		DATE	COMMODITY	CLASS	DEATHS	INJURIES	DAMAGES	CONTAINR	AMT RELSD	FAILURES		R	MODE
6030389A	LONGMONT	CO	76/02/13	SULFURIC ACID FUMIN	COR	0	0	40	MC311	100 GAL	22	0	5	H-H
4070606A	SALEM	MO	74/07/18	SULFURIC ACID FUMIN	COR	0	0	2,000	TANK TRL	0	17	0	5	H-H
4050262A	SAFFORD	AZ	74/05/01	SULFURIC ACID FUMIN	COR	0	0	650	TANK TRL	0	2	17	5	H-H
4030291A	LAKE WALES	FL	74/03/06	SULFURIC ACID FUMIN	COR	0	0	100,000	MC312	0	11	17	5	H-H
5050636A	W PITTSBURGH	PA	75/05/06	SULFURIC ACID FUMIN	COR	0	0	400	MC312	0	17	0	5	H-H
8051214A	CARRIZO	AZ	78/02/24	SULFURIC ACID	COR	0	0	500	MC312	1800 GAL	22	0	5	H-H
7050587A	METROPOLIS	IL	77/04/29	SULFURIC ACID	COR	0	0	100	MC312	15 GAL	22	0	5	H-H
7060012A	PERIDOT	AZ	77/05/20	SULFURIC ACID	COR	0	0	144	MC331	2200 GAL	22	0	5	H-H
6110531A	LEWISVILLE	AR	76/11/08	SULFURIC ACID FUMIN	COR	0	0	10,800	MC312	100 GAL	22	0	5	H-H
8040918D	VERO BEACH	FL	78/03/03	SULFURIC ACID	COR	0	0	0	2T	570 GAL	22	0	5	H-H
7060438A	MARTINEZ	CA	77/05/28	SULFURIC ACID	COR	0	0	25,000	TANK TRL	200 GAL	22	0	5	H-H
7060523A	PERIDOT	AZ	77/05/20	SULFURIC ACID	COR	0	0	144	MC312	1040 GAL	22	0	5	H-H
7031073A	S HOLLAND	IL	77/03/21	SULFURIC ACID	COR	0	0	8,000	MC312	1000 GAL	2	22	5	H-H
6050762A	COPPERHILL	TN	76/05/10	SULFURIC ACID FUMIN	COR	0	0	1,000	MC312	3672 GAL	2	22	5	H-H
7030199A	PALMERTON	PA	77/02/22	SULFURIC ACID	COR	0	0	100	MC312	1 GAL	2	22	5	H-H
7090069A	PORT ALLEN	TX	77/08/05	SULFURIC ACID	COR	0	0	1,600	MC306	33260 LBS	22	0	5	H-H
8040772A	NATURITA	CO	78/04/07	SULFURIC ACID	COR	0	0	22,000	MC312	933 GAL	22	0	5	H-H
8030377C	SANTA ANA	CA	78/02/22	SULFURIC ACID	COR	0	0	1,362	BOTL GLS	108 GAL	22	0	5	H-H
7111111A	STRATTON	OH	77/11/14	SULFURIC ACID	COR	0	0	200	MC312	4 OZS	22	0	5	H-H
8030189A	SHOWLOW	AZ	78/02/24	SULFURIC ACID	COR	0	0	500	TANK TRK	17880 LBS	22	0	5	H-H
8071252A	EFFINGHAM	IL	78/07/10	SULFURIC ACID	COR	0	0	25	BOTL GLS	2 QTS	22	0	5	H-H
8110830A	LA SALLE	UT	78/11/04	SULFURIC ACID	COR	0	0	300	TANK TRK	200 GAL	22	0	5	H-H
8111118A	CLIFTON	AZ	78/10/31	SULFURIC ACID	COR	0	0	3,000	MC312	3144 GAL	2	22	5	H-H
8070222A	STEVENSON	AL	78/05/18	SULFURIC ACID	COR	0	0	6,000	MC311	200 GAL	22	0	5	H-H
3110382A	BELLE	WV	73/11/09	SULFURIC ACID FUMIN	COR	0	1	1,200	1H	0	2	7	6	H-P
5050492A	BENTONIA	MS	75/04/21	SULFURIC ACID FUMIN	COR	0	0	8,000	34	0	17	0	5	H-P
5080122A	PADUCAH	KY	75/07/26	SULFURIC ACID FUMIN	COR	0	0	30,000	MC312	0	17	0	5	H-P
4070862B	PRYOR	OK	74/07/11	WATER TREAT COMP	COR	0	0	0	DRUM MTL	0	17	0	5	H-H
8020572A	HACKBERRY	AZ	78/01/25	WATER TREAT COMP	COR	0	0	3,500	LINR PLS	1815 GAL	22	0	5	H-H
8040564A	SUMMIT	IL	78/03/19	WATER TREAT COMP	COR	0	0	50	CAN	5 GAL	22	0	6	H-H
6040194Z	BROWNFIELD	TX	76/03/13	ZINC CHLORIDE SLN	COR	0	0	0	MC312	0	17	22	1	H-H

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TOTALS: DEATHS = 77 *** INJURIES = 596 *** DAMAGES = $21,347,291 *** VEHICULAR ACCIDENTS = 2,131

RECORDS ARE SORTED BY CLASS AND COMMODITY CODES
2,131 RECORDS FOUND

BMCS REPORTS

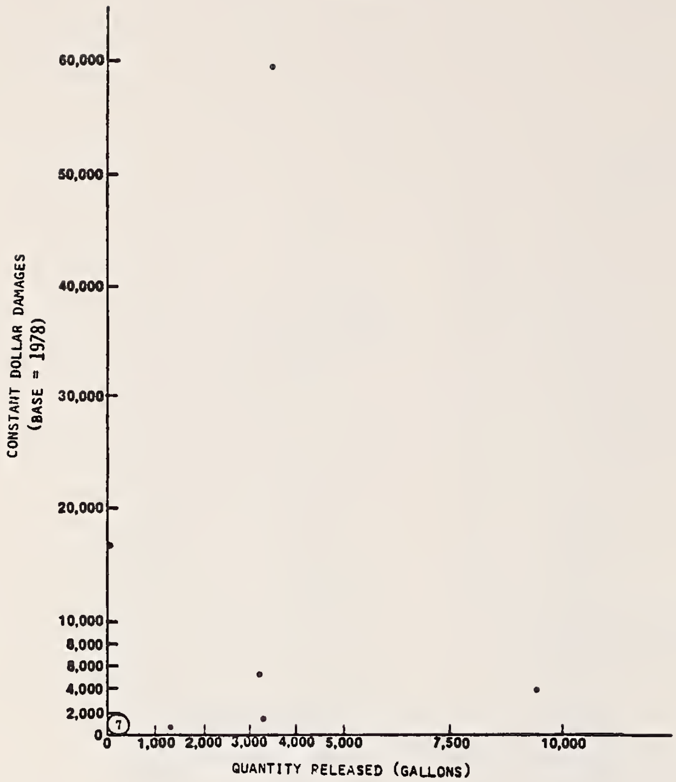
Date	City	State	Commodity	Class	Deaths	Inju- ries	Current Dollar Damages	Amount Released
02/04/76	New Castle	DA	Fuel Oil	Comb L	3	3	22,000	UNK
01/23/76	Cannon Falls	NM	Fuel Oil	Comb L	0	0	7,000	UNK
11/22/73	New Cumberland	PA	Fuel Oil	Comb L	2	0	320,000	UNK
02/22/74	Camanche	TX	Fuel Oil	Comb L	1	0	27,000	UNK
03/28/74	Beckly	WV	Butyl Chloride	F.L.	0	0	14,000	UNK
04/08/75	Rodeo	CA	Fl. Liq. N.O.S.	F.L.	0	0	7,000	55 Gal.
04/10/75	Sun Valley	CA	Fl. Liq. N.O.S.	F.L.	0	4	120,000	UNK
05/16/76	Massie Twnshp.	OH	Fl. Liq. N.O.S.	F.L.	0	0	30,000	UNK
12/05/73	Eastland	TX	Gasoline	F.L.	1	1	15,000	UNK
09/08/73	LaGrand	OR	Gasoline	F.L.	1	0	50,000	UNK
01/17/76	Sacramento	CA	Gasoline	F.L.	4	5	11,700	UNK
10/18/73	Kansas City	MO	Gasoline	F.L.	2	0	1,000,000	UNK
10/07/74	No. Platte	NB	Gasoline	F.L.	1	0	250,000	UNK
01/17/74	Plainfield	IL	Gasoline	F.L.	1	1	55,000	UNK
12/13/75	E. Hartford	CT	Gasoline	F.L.	0	1	25,000	UNK
01/26/76	Enfield	NH	Gasoline	F.L.	0	0	10,000	UNK
07/06/76	Kansas City	KS	Gasoline	F.L.	0	2	75,000	UNK
01/08/74	Los Angeles	CA	Gasoline	F.L.	1	0	295,000	UNK
07/27/74	Epsour	NH	Gasoline	F.L.	1	2	3,000	UNK
01/18/76	Windham	NH	Gasoline	F.L.	1	4	25,000	UNK
08/23/76	Manila	VT	Gasoline	F.L.	1	0	40,000	UNK
01/20/76	Falmouth	ME	Gasoline	F.L.	0	1	24,000	UNK
06/12/78	Des Moines	IO	Paint	F.L.	1	1	50,000	UNK
07/24/76	Green River	VT	Ammonium Nitrate	Oxidizer	2	0	50,000	UNK
04/27/76	Brisco	AK	Nydrogen Peroxide	Oxidizer	0	1	34,400	UNK
01/08/76	Gallop	NM	Butane	F.G.	4	3	50,000	UNK
08/06/76	Kansas City	KS	Fl. Comp. Gas	F.G.	0	0	30,000	UNK
05/26/76	Portland	MI	L.P.G.	F.G.	0	1	8,000	UNK
04/17/75	Becket	MA	L.P.G.	F.G.	0	1	7,000	UNK
02/13/74	Gainesville	GA	L.P.G.	F.G.	0	1	9,200	UNK
08/27/74	Kansas City	MO	L.P.G.	F.G.	0	0	10,000	UNK
05/22/74	Golden	CO	L.P.G.	F.G.	0	1	14,000	UNK
09/28/73		TX	Poisonous Sol. N.O.S.	Poison B	1	0	63,200	UNK
02/01/76	El Reno	OK	High Explosives	Expl. A	2	0	76,000	UNK
08/08/74	Chicago	IL	Caustic Soda	COR	2	10	15,000	UNK
11/07/75	LaFayette	IN	Sulfur Trioxide	COR	1	1	52,000	UNK

APPENDIX C

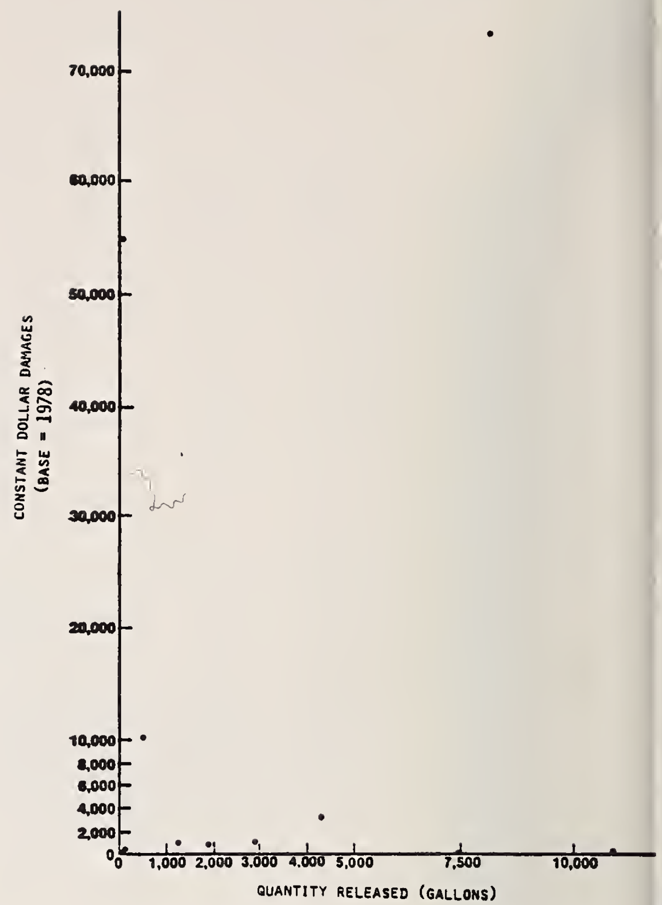
PLOTS OF THE QUANTITY SPILLED VS. CONSTANT DOLLAR DAMAGES (1978) FOR HAZARDOUS MATERIALS INVOLVED IN 10 OR MORE HIGHWAY ACCIDENTS BETWEEN JULY 1973 AND DECEMBER 1978

Note: The data for these plots were derived from the MTB computer printout in Appendix B. A complete listing of the quantity spilled and constant dollar damages for every hazardous materials accident reported between July 1973 and December 1978 is in the possession of the Federal Highway Administration.

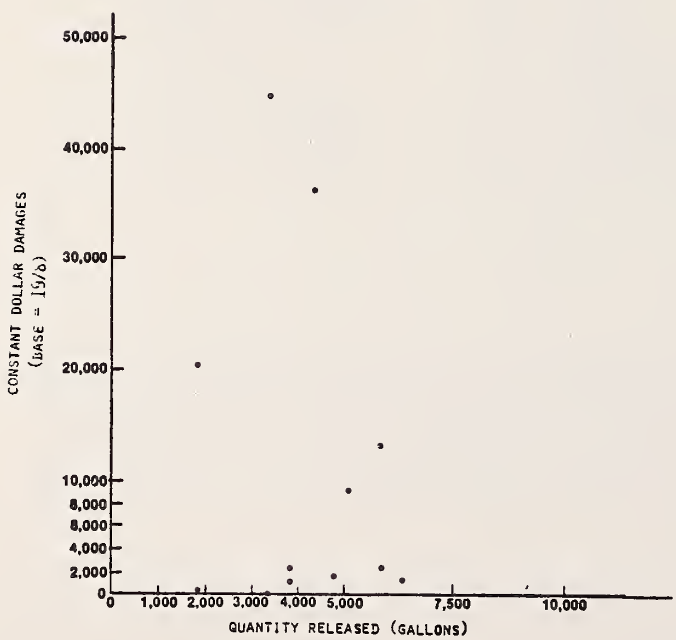
Alcohol N.O.S.



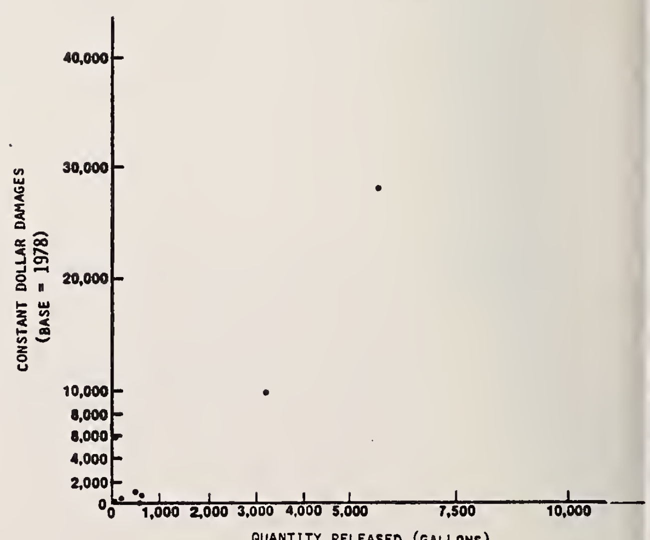
Anhydrous Ammonia

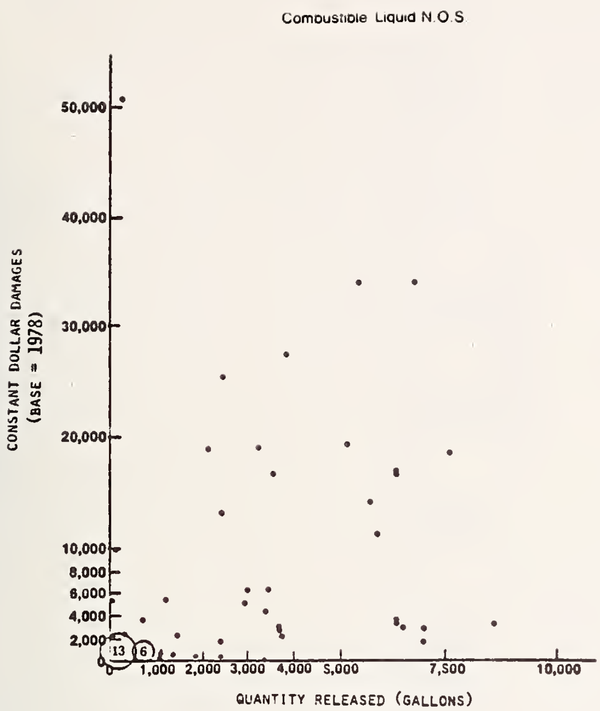


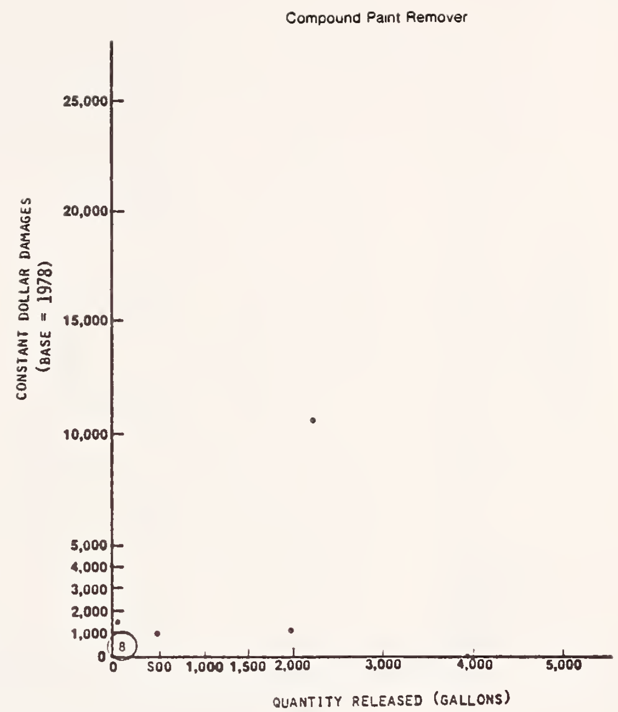
Asphalt Cut Back

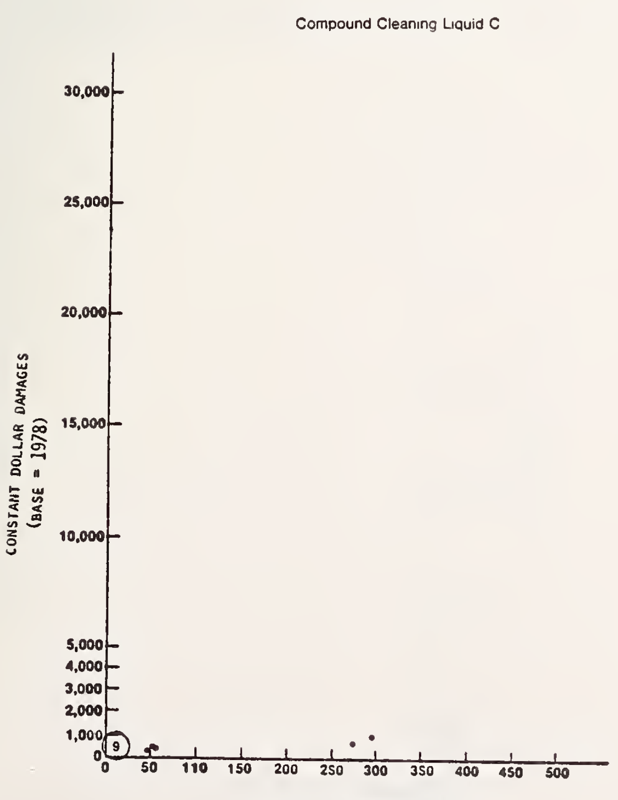


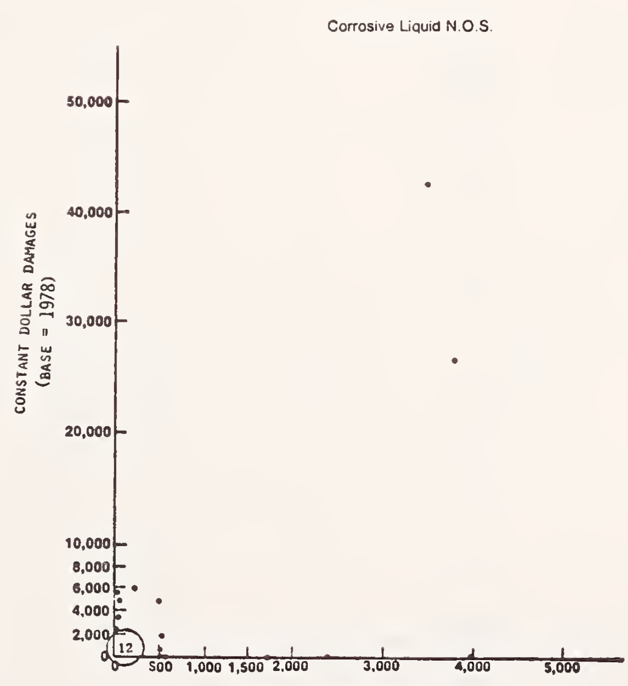
Acetone

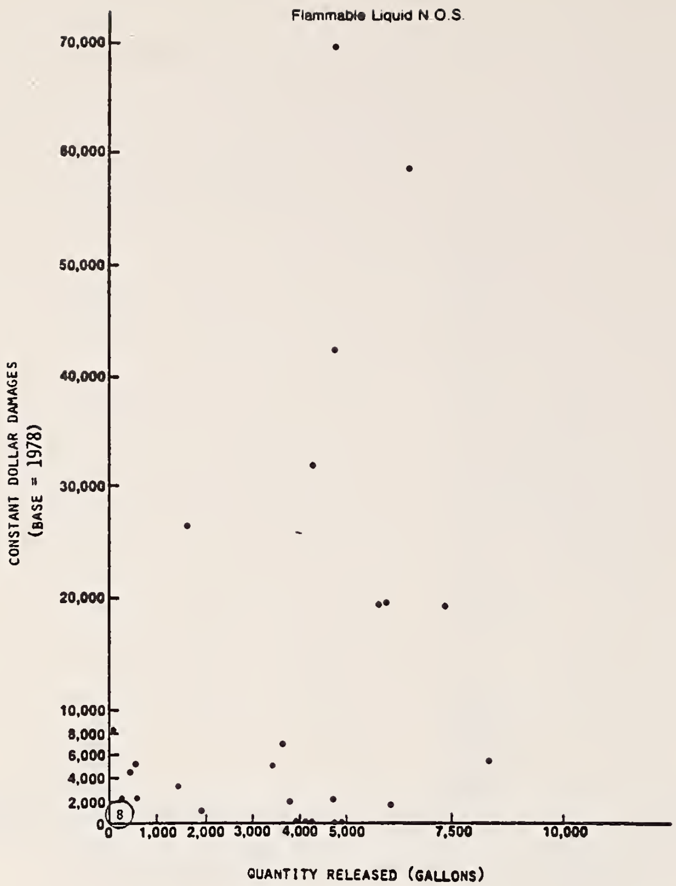


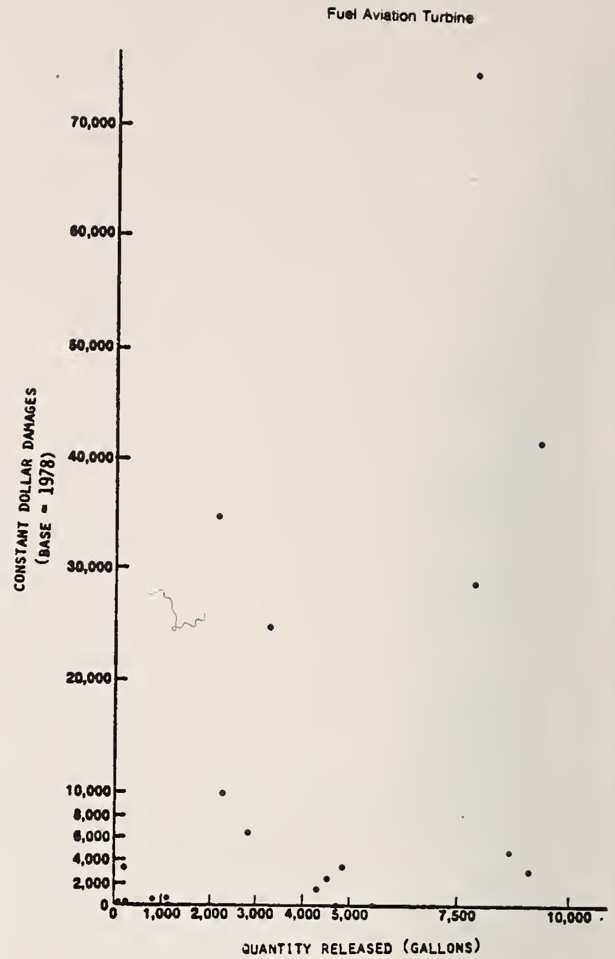

Combustible Liquid N.O.S
CONSTANT DOLLAR DAMAGES (BASE = 1978)
50,000
40,000
30,000
20,000
10,000
8,000
6,000
4,000
2,000
0
13
6
0
1,000
2,000
3,000
4,000
5,000
7,500
10,000
QUANTITY RELEASED (GALLONS)

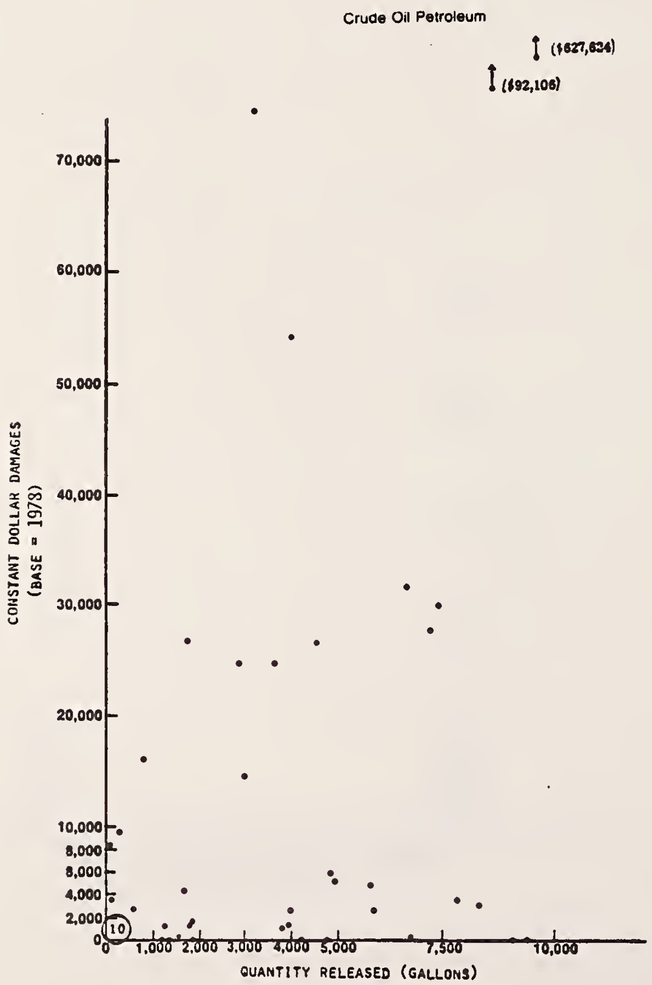

Compound Paint Remover
CONSTANT DOLLAR DAMAGES (BASE = 1978)
25,000
20,000
15,000
10,000
5,000
4,000
3,000
2,000
1,000
0
8
0
500
1,000
1,500
2,000
3,000
4,000
5,000
QUANTITY RELEASED (GALLONS)

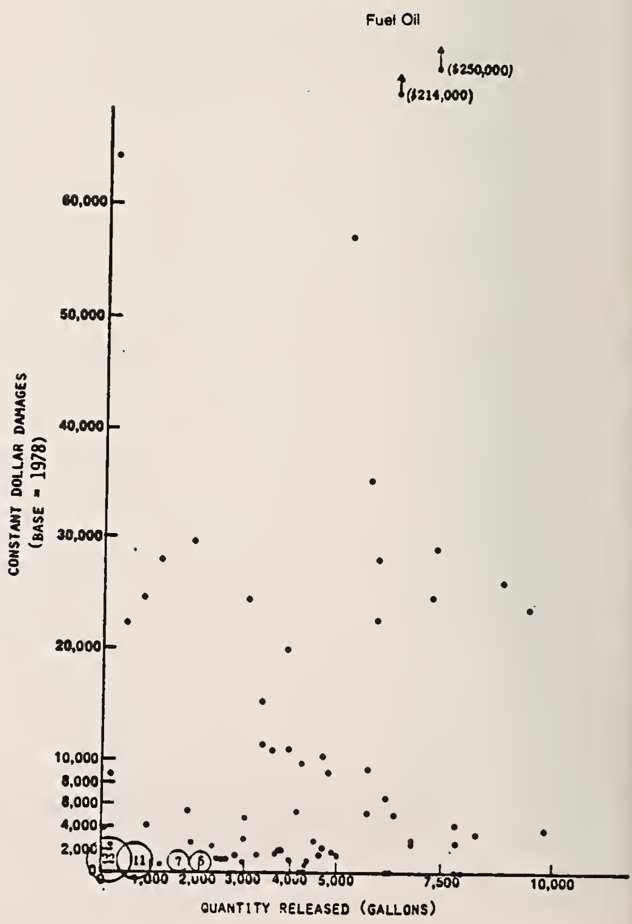

Compound Cleaning Liquid C
CONSTANT DOLLAR DAMAGES (BASE = 1978)
30,000
25,000
20,000
15,000
10,000
5,000
4,000
3,000
2,000
1,000
0
9
0
50
110
150
200
250
300
350
400
450
500
QUANTITY RELEASED (GALLONS)


Corrosive Liquid N.O.S.
CONSTANT DOLLAR DAMAGES (BASE = 1978)
50,000
40,000
30,000
20,000
10,000
8,000
6,000
4,000
2,000
0
12
500
1,000
1,500
2,000
3,000
4,000
5,000
QUANTITY RELEASED (GALLONS)

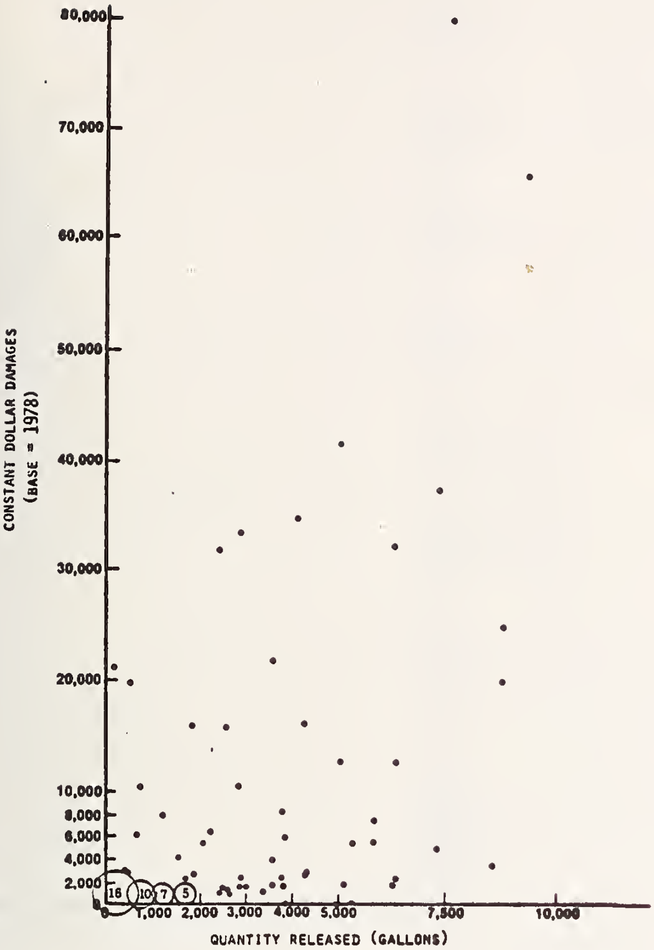

Flammable Liquid N.O.S.
CONSTANT DOLLAR DAMAGES (BASE = 1978)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
8,000
6,000
4,000
2,000
0
8
1,000 2,000 3,000 4,000 5,000 7,500 10,000
QUANTITY RELEASED (GALLONS)


Fuel Aviation Turbine
CONSTANT DOLLAR DAMAGES (BASE = 1978)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
8,000
6,000
4,000
2,000
0
1,000 2,000 3,000 4,000 5,000 7,500 10,000
QUANTITY RELEASED (GALLONS)

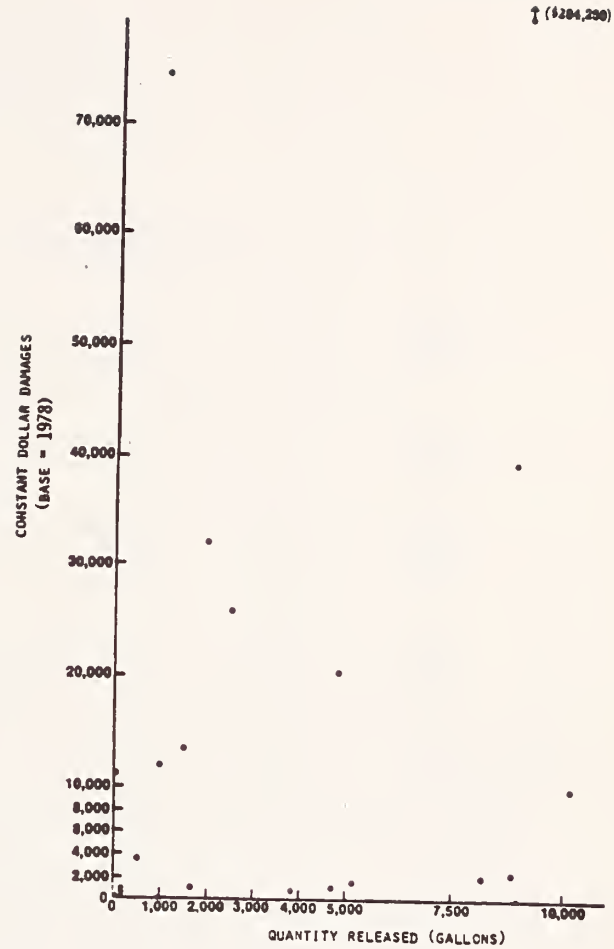

Crude Oil Petroleum
($627,634)
($92,106)
CONSTANT DOLLAR DAMAGES (BASE = 1978)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
8,000
6,000
4,000
2,000
0
10
1,000 2,000 3,000 4,000 5,000 7,500 10,000
QUANTITY RELEASED (GALLONS)


Fuel Oil
($250,000)
($214,000)
CONSTANT DOLLAR DAMAGES (BASE = 1978)
60,000
50,000
40,000
30,000
20,000
10,000
8,000
6,000
4,000
2,000
134
11
7
1,000 2,000 3,000 4,000 5,000 7,500 10,000
QUANTITY RELEASED (GALLONS)

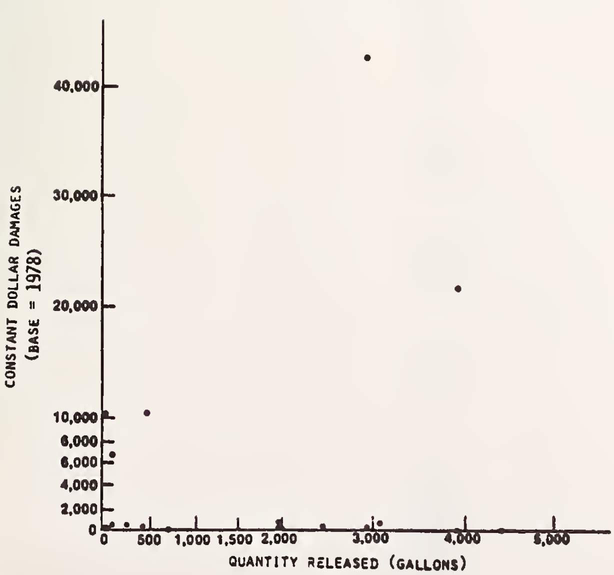
Fuel Oil 1,2,4 5



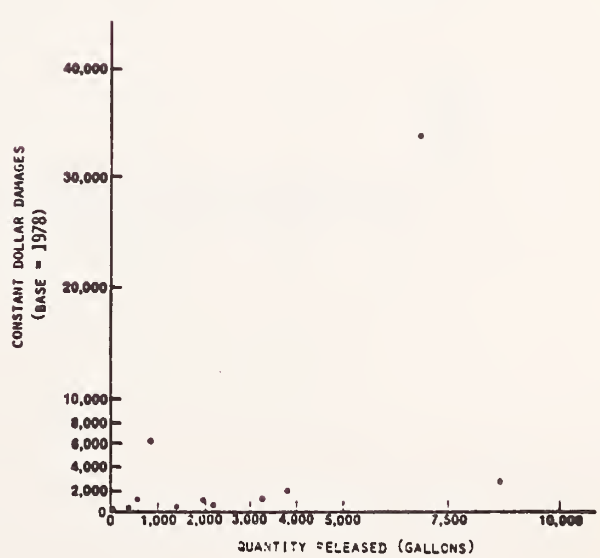
Liquid Petroleum Gas

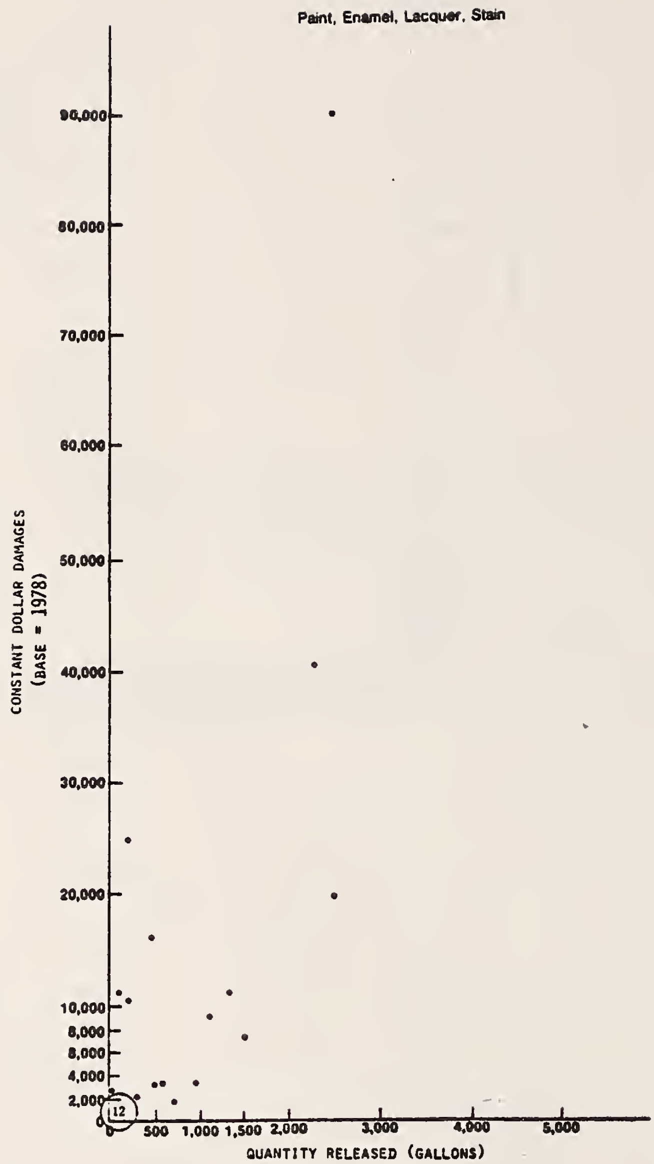


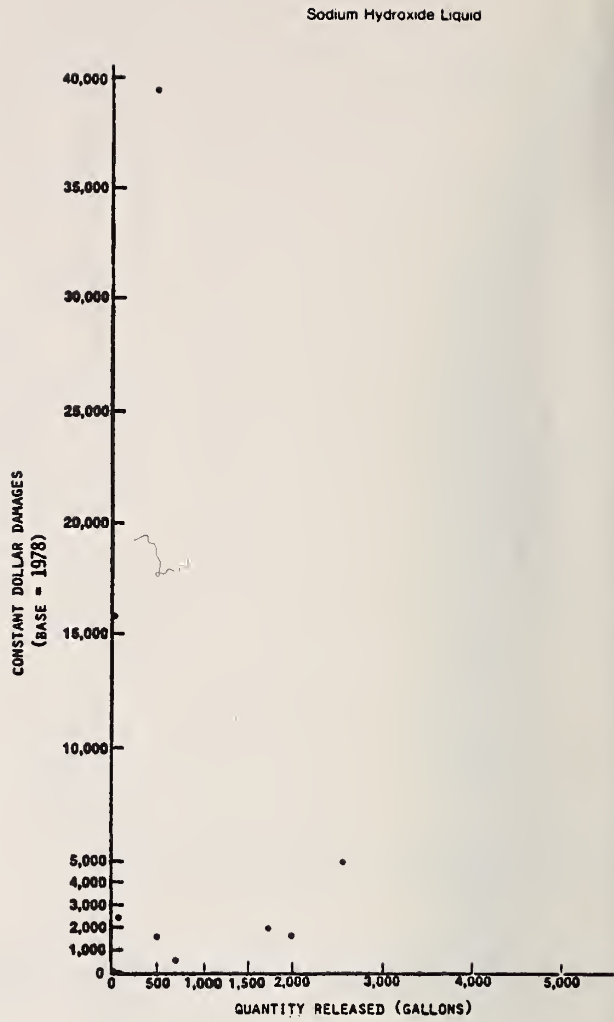
Hydrochloric Acid

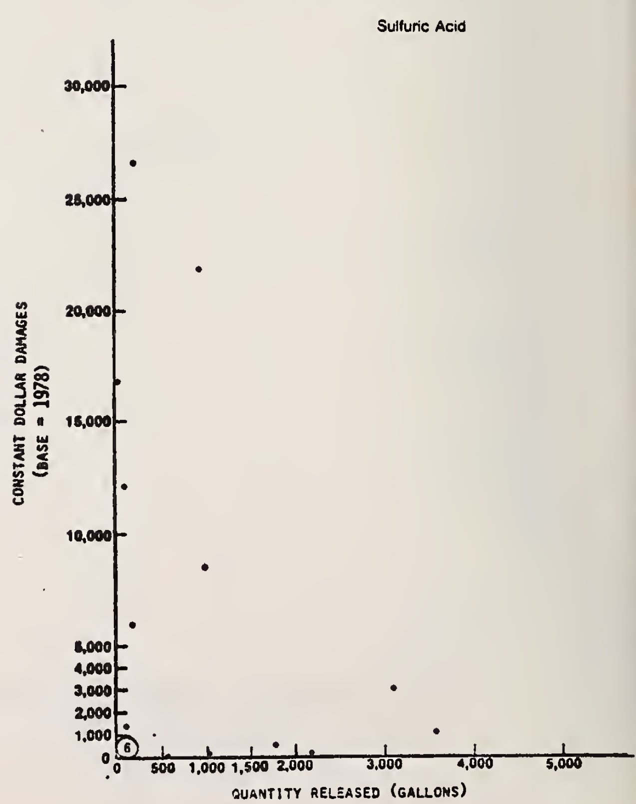


Oil N O S




Paint, Enamel, Lacquer, Stain
CONSTANT DOLLAR DAMAGES
(BASE = 1978)
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
8,000
6,000
4,000
2,000
0
12
0
500
1,000
1,500
2,000
3,000
4,000
5,000
QUANTITY RELEASED (GALLONS)


Sodium Hydroxide Liquid
CONSTANT DOLLAR DAMAGES
(BASE = 1978)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
4,000
3,000
2,000
1,000
0
0
500
1,000
1,500
2,000
3,000
4,000
5,000
QUANTITY RELEASED (GALLONS)


Sulfuric Acid
CONSTANT DOLLAR DAMAGES
(BASE = 1978)
30,000
25,000
20,000
15,000
10,000
5,000
4,000
3,000
2,000
1,000
0
6
0
500
1,000
1,500
2,000
3,000
4,000
5,000
QUANTITY RELEASED (GALLONS)

GASOLINE

Constant Dollar Damange (Base = 1978)

	500	1,000	2,000	4,000	8,000	16,000
160,000	0	0	0	0	0	5
80,000	0	0	1	1	7	5
40,000	1	1	0	6	19	21
20,000	2	0	6	6	19	10
10,000	2	2	6	5	13	4
5,000	3	1	6	9	12	7
1,000	12	4	13	31	47	14
0	63	15	14	17	15	7

Amount Released (Gallons)

APPENDIX D

WORKSHEET 1: ROADWAY INVENTORIES FOR THE FOUR ALTERNATIVE ROUTES IN THE WASHINGTON, D. C., CASE STUDY

Alternative: 1

Date:

Page 1 of 1

WORKSHEET 1: ROADWAY INVENTORY

1 SEGMENT #	1 SEGMENT O/D	2 ROAD TYPE	3 NUMBER OF LANES	4 URBAN SUBURBAN RURAL	5 LENGTH	6 SPEED LIMT	7 ADT (000)	8 TRAFFIC SIGNAL #	8 TRAFFIC SIGNAL PER MILE	9 HEAVY VOLUME INTERSECTIONS #	9 HEAVY VOLUME INTERSECTIONS PER MILE	10 TERRAIN L	10 TERRAIN R	10 TERRAIN M	11 ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	12 COMMENTS (curve, grade, fog, ice)
1-A	From: I-495& I-395 To: I-495& Tele-graph Road	I-S	6	Urban	5.0	55	90.5	-	-	-	-	-	-	-	1.515	
1-B	From: Tele-graph Road To: Rte.1	I-S	6	"	1.3	"	88.8	-	-	-	-	-	-	-	1.499	
1-C	To: Indian Head High-way	I-S	6	"	3.0	"	101.0	-	-	-	-	-	-	-	1.614	
1-D	To: Penna. Avenue	I-S	6	"	6.4	"	82.1	-	-	-	-	-	-	-	1.435	
1-E	To: I-495 & Rte.50	I-S	6	Urban	7.6	55	95.0	-	-	-	-	-	-	-	1.557	

Alternative: 2

Date: ______

Page 1 of 2

WORKSHEET 1: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMIT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		
2-A	From: I-395& I-495 To: Tele-graph Road	I-S	6	Urban	5.0	55	90.5	-	-	-	-	-	-	-	1.515	
2-B	To: Rte.1	I-S	6	"	1.3	"	88.8	-	-	-	-	-	-	-	1.499	
2-C	To: Indian Head High-way	I-S	6	"	3.0	"	101.0	-	-	-	-	-	-	-	1.614	
2-D	To: I-295 & Port-land Street	I-S	4	"	3.1	"	43.0	-	-	-	-	-	-	-	1.613	
2-E	To: Suit-land P-way	I-S	4	"	1.8	"	65.5	-	-	-	-	-	-	-	2.153	
2-F	To: Minne-sota Ave.	I-S	4	"	3.8	55	81.1	-	-	-	-	-	-	-	2.527	

Alternative: 2

Date:

Page 2 of 2

WORKSHEET I: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMIT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		
2-G	To: B-W P-way& Rte.50	I-S	4	Urban	1.4	55	60.3	-	-	-	-	-	-	-	2.027	
2-H	To: Land-over Ave.	Urban Ar-terial	4	"	2.3	45	50.0	0	0	0	0	-	-	-	3.430	
2-I		Urban Ar-terial	4	"	2.6	45	37.5	0	0	0	0	-	-	-	3.420	

Alternative: 3

Date:

Page 1 of 2

WORKSHEET 1: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMIT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		
3-A	From: I-395& I-495 To: Duke Street	I-S	6	Urban	2.7	55	109.8	–	–	–	–	–	–	–	1.696	
3-B	To: King Street	I-S	6	"	2.5	"	123.1	–	–	–	–	–	–	–	1.822	
3-C	To: Wash-ington Blvd.	I-S	6	"	2.5	"	127.0	–	–	–	–	–	–	–	1.859	
3-D	To: 14th Street Bridge	I-S	6	"	1.8	"	129.1	–	–	–	–	–	–	–	1.878	Numerous entrance and exit ramps
3-E	To: 11th Street Bridge &I-295	I-S	4	"	3.0	"	115.3	–	–	–	–	–	–	–	1.749	
3-F	To: Suit-land P-way	I-S	4	"	0.7	"	101.7	–	–	–	–	–	–	–	3.022	Sharp turn under I-295 where HC carriers reverse direction

Alternative: 3

Date:

Page 2 of 2

WORKSHEET 1: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMIT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		
3-G	To: Minne-sota Ave.	I-S	4	Urban	3.8	55	81.1	-	-	-	-	-	-	-	2.527	
3-H	To: Rte.50 & B-W P-way	I-S	4	"	1.4	"	60.3	-	-	-	-	-	-	-	2.027	
3-I	To: Land-over Ave.	Urban Ar-terial	4	"	2.3	45	50.0	0	0	0	0	-	-	-	3.430	
3-J	To: I-495 & Rte.50	Urban Ar-terial	4	"	2.6	45	37.5	0	0	0	0	-	-	-	3.420	

Alternative: 4

Date:

Page 1 of 2

WORKSHEET I: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		
4-A	From: I-395& I-495 To: Duke Street	Inter-state	6	Sub-urban	2.7	55	109.8	–	–	–	–	–	–	–	1.768	
4-B	From: Duke Street To: King Street	"	6	"	2.5	55	123.1	–	–	–	–	–	–	–	2.154	
4-C	From: King Street To: Wash-ington Blvd.	"	6	"	2.5	55	127.0	–	–	–	–	–	–	–	2.197	
4-D	To: 14th Street Bridge	"	6	"	1.8	55	129.1	–	–	–	–	–	–	–	2.220	
4-E	To: New Jersey Ave. & Rte.50	Inter-state	6	Urban	2.9	55	106.7	–	–	–	–	–	–	–	1.974	
4-F	To: Brent-wood P-way	Urban Ar-terial	4	Urban	1.4	45	56.3	5	3.6	8	5.7	–	–	–	5.580	

Alternative: 4

Date: ________

Page 2 of 2

WORKSHEET I: ROADWAY INVENTORY

1		2	3	4	5	6	7	8		9		10			11	12
SEGMENT		ROAD TYPE	NUMBER OF LANES	URBAN SUBURBAN RURAL	LENGTH	SPEED LIMIT	ADT (000)	TRAFFIC SIGNAL		HEAVY VOLUME INTERSECTIONS		TERRAIN			ACCIDENT RATE ESTIMATED OR OBSERVED (acc/mvm)	COMMENTS (curve, grade, fog, ice)
#	O/D							#	PER MILE	#	PER MILE	L	R	M		
4-G	To: South Dakota Ave.	Urban Ar-terial	4	Urban	2.2	45	63.9	4	1.8	12	5.5				4.820	
4-H	To: B-W P-way	"	4	"	1.1	45	56.2	0	0	0	0	-	-	-	3.430	
4-I	To: Land-over Rd.	"	4	"	2.3	45	50.0	0	0	0	0	-	-	-	3.430	
4-J	To: I-495 & Rte.50	"	4	"	2.6	45	37.5	0	0	0	0	-	-	-	3.420	

WORKSHEET 6: ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 1
Date
Page 1 of 1

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
6 Lane Interstate (Rural/Suburban	1-A	Y = .45 + .012 (90.5) = 1.536 acc/mvm	P(acc/v) = 1.536 acc/mvm x 5 (v-m/v) = 7.680 x 10^{-6}
6 Lane Interstate (Rural/Suburban	1-B	Y = .45 + .012 (88.8) = 1.516 acc/mvm	P(acc/v) = 1.516 acc/mvm x 1.3 (v-m/v) = 1.971 x 10^{-6}
6 Lane Interstate (Rural/Suburban	1-C	Y = .45 + .012 (101.0) = 1.662 acc/mvm	P(acc/v) = 1.662 acc/mvm x 3.0 (v-m/v) = 4.986 x 10^{-6}
6 Lane Interstate (Rural/Suburban	1-D	Y = .45 + .012 (82.1) = 1.435 acc/mvm	P(acc/v) = 1.435 acc/mvm x 6.4 (v-m/v) = 9.185 x 10^{-6}
6 Lane Interstate (Rural/Suburban	1-E	Y = .45 + .012 (95.0) = 1.590 acc/mvm	P(acc/v) = 1.590 acc/mvm x 7.6 (v-m/v) = 12.084 x 10^{-6}

Legend:

- Y = accidents/million vehicle-miles
- acc = accident
- mvm = million vehicle-miles
- v-m = vehicle-miles
- v = vehicle
- P(acc) = probability of accident

WORKSHEET 6: ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 2
Date
Page 1 of 2

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
6 Lane Interstate (Rural Suburban	2-A	Y = .45 + .012 (90.5) = 1.536 acc/mvm	P(acc/v) = 1.536 acc/mvm x 5 (v-m/v) = 7.680 x 10^{-6}
6 Lane Interstate (Rural Suburban	2-B	Y = .45 + .012 (88.8) = 1.516 acc/mvm	P(acc/v) = 1.516 acc/mvm x 1.3 (v-m/v) = 1.971 x 10^{-6}
6 Lane Interstate (Rural/Suburban	2-C	Y = .45 + .012 (101.0) = 1.662 acc/mvm	P(acc/v) = 1.662 acc/mvm x 3.0 (v-m/v) = 4.986 x 10^{-6}
4 Lane Interstate (Urban)	2-D	Y = .80 + .020 (43.0) = 1.660 acc/mvm	P(acc/v) = 1.660 acc/mvm x 3.1 (v-m/v) = 5.146 x 10^{-6}
4 Lane Interstate (Urban)	2-E	Y = .80 + .020 (65.5) = 2.11 acc/mvm	P(acc/v) = 2.11 acc/mvm x 1.8 (v-m/v) = 3.798 x 10^{-6}

Legend:

Y = accidents/million vehicle-miles
acc = accident
mvm = million vehicle-miles
v-m = vehicle-miles
v = vehicle
P(acc) = probability of accident

WORKSHEET 6: ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 2
Date ______
Page 2 **of** 2

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
4 Lane Interstate (Urban)	2-F	Y = .80 + .020 (81.1) = 2.422 acc/mvm	P(acc/v) = 2.422 acc/mvm x3.8 (v-m/v) = 9.204 x 10^{-6}
4 Lane Interstate (Urban)	2-G	Y = .80 + .020 (60.3) = 2.006 acc/mvm	P(acc/v) = 2.006 acc/mvm x1.4 (v-m/v) = 2.808 x 10^{-6}
Urban Arterial	2-H	Y* = .261 + 1.256 (50.0) + 3.909 (0) + 6.086 (0) = 62.5 acc/yr/m or = 3.43 acc/mvm	P(acc/v) = 3.43 acc/mvm x 2.3 (v-m/v) = 7.889 x 10^{-6}
Urban Arterial	2-I	Y* = .261 + 1.256 (37.5) + 3.909 (0) + 6.086 (0) = 46.8 acc/yr/m = 3.42 acc/mvm	P(acc/v) = 3.42 acc/mvm x 2.6 (v-m/v) = 8.892 x 10^{-6}

Legend:

- Y = accidents/million vehicle-miles
- acc = accident
- mvm = million vehicle-miles
- v-m = vehicle-miles
- v = vehicle
- P(acc) = probability of accident

*Y = accidents/year/mile

WORKSHEET 6: ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 3
Date ______
Page 1 **of** 2

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
6 Lane Interstate (Rural Suburban	3–A	Y = .45 + .012 (109.8) = 1.768 acc/mvm	P(acc/v) = 1.768 acc/mvm x 2.7 (v-m/v) = 4.773 x 10^{-6}
6 Lane Interstate (Urban)	3–B	Y = .80 + .011 (123.1) = 2.154 acc/mvm	P(acc/v) = 2.154 acc/mvm x 2.5 (v-m/v) = 5.385 x 10^{-6}
6 Lane Interstate (Urban)	3–C	Y = .80 + .011 (127.0) = 2.197 acc/mvm	P(acc/v) = 2.197 acc/mvm x 2.5 (v-m/v) = 5.493 x 10^{-6}
6 Lane Interstate (Urban)	3–D	Y = .80 + .011 (129.1) = 2.220 acc/mvm	P(acc/v) = 2.220 acc/mvm x 1.8 (v-m/v) = 3.996 x 10^{-6}
6 Lane Interstate (Urban)	3–E	Y = .80 + .011 (115.3) = 2.068 acc/mvm	P(acc/v) = 2.068 acc/mvm x 3.0 (v-m/v) = 6.204 x 10^{-6}

Legend:

Y = accidents/million vehicle-miles
acc = accident
mvm = million vehicle-miles
v-m = vehicle-miles
v = vehicle
P(acc) = probability of accident

WORKSHEET 6: ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 3
Date
Page 2 of 2

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
4 Lane Interstate (Urban)	3-F	Y = .80 + .020 (101.7) = 2.834 acc/mvm	P(acc/v) = 2.834 acc/mvm x 0.7 (v-m/v) = 1.984×10^{-6}
4 Lane Interstate (Urban)	3-G	Y = .80 + .020 (81.8) = 2.422 acc/mvm	P(acc/v) = 2.422 acc/mvm x 3.8 (v-m/v) = 9.204×10^{-6}
4 Lane Interstate (Urban)	3-H	Y = .80 + .020 (60.3) = 2.006 acc/mvm	P(acc/v) = 2.006 acc/mvm x 1.4 (v-m/v) = 2.808×10^{-6}
Urban Arterial	3-I	Y* = -.261 + 1.256 (50.0) + 3.909 (0) + 6.086 (0) = 62.5 acc/yr/m or 3.43 acc/mvm	P(acc/v) = 3.43 acc/mvm x 2.3 (v-m/v) = 7.889×10^{-6}
Urban Arterial	3-J	Y* = -.261 + 1.256 (37.5) + 3.909 (0) + 6.086 (0) = 46.8 acc/yr/m or = 3.42 acc/mvm	P(acc/v) = 3.42 acc/mvm x 2.6 (v-m/v) = 8.892×10^{-6}

Legend:

- Y = accidents/million vehicle-miles
- acc = accident
- mvm = million vehicle-miles
- v-m = vehicle-miles
- v = vehicle
- P(acc) = probability of accident

*Y = accidents/year/mile

WORKSHEET 6: ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 4
Date ______
Page 1 **of** 2

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
6 Lane Interstate (Rural/Suburban	4-A	Y = .45 + .012 (109.8) = 1.768 acc/mvm	P(acc/v) =1.768 acc/mvm x2.7 (v-m/v) =4.773 x 10^{-6}
6 Lane Interstate (Urban)	4-B	Y = .80 + .011 (123.1) = 2.154 acc/mvm	P(acc/v) =2.154 acc/mvm x2.5 (v-m/v) =5.385 x 10^{-6}
6 Lane Interstate	4-C	Y = .80 + .011 (127.0) = 2.197 acc/mvm	P(acc/v) =2.197 acc/mvm x2.5 (v-m/v) =5.493 x 10^{-6}
6 Lane Interstate	4-D	Y = .80 +.011 (129.1) = 2.220 acc/mvm	P(acc/v) =2.220 acc/mvm x1.8 (v-m/v) =3.996 x 10^{-6}
6 Lane Interstate	4-E	Y = .80 + .011 (106.7) = 1.974 acc/mvm	P(acc/v) =1.974 acc/mvm x2.9 (v-m/v) =5.724 x 10^{-6}

Legend:

Y = accidents/million vehicle-miles
acc = accident
mvm = million vehicle-miles
v-m = vehicle-miles
v = vehicle
P(acc) = probability of accident

WORKSHEET 6: ACCIDENT RATE AND PROBABILITY CALCULATIONS

Alternative 4

Date ______

Page 2 **of** 2

MODEL	SEGMENT	ACCIDENT RATE Estimated or Observed (acc/mvm)	PROBABILITY
Urban Arterial	4-F	$Y^* = -.261 + 1.256\ (56.3) + 3.909\ (5.7) + 6.086\ (3.6)$ = 114.6 acc/yr/mile or Y = 5.580 acc/mvm	P(acc/v) = 5.580 acc/mvm x 1.4 (v-m/v) = 7.812×10^{-6}
Urban Arterial	4-G	$Y^* = -.261 + 1.256\ (63.9) + 3.909\ (5.5) + 6.086\ (1.8)$ = 112.5 acc/yr/mile or Y = 4.820 acc/mvm	P(acc/v) = 4.820 acc/mvm x 2.2 (v-m/v) = 10.604×10^{-6}
Urban Arterial	4-H	$Y^* = -.261 + 1.256\ (56.2) + 3.909\ (0) + 6.086\ (0)$ = 70.3 acc/yr/mile or Y = 3.430 acc/mvm	P(acc/v) = 3.430 acc/mvm x 1.1 (v-m/v) = 3.773×10^{-6}
Urban Arterial	4-I	$Y^* = -.261 + 1.256\ (50.0) + 3.909\ (0) + 6.086\ (0)$ = 62.5 acc/yr/mile or Y = 3.430 acc/mvm	P(acc/v) = 3.430 acc/mvm x 2.3 (v-m/v) = 7.889×10^{-6}
Urban Arterial	4-J	$Y^* = -.261 + 1.256\ (37.5) + 3.909\ (0) + 6.086\ (0)$ = 46.84 or 3.420 acc/mvm	P(acc/v) = 3.420 acc/mvm x 2.6 (v-m/v) = 8.892×10^{-6}

Legend:

Y = accidents/million vehicle-miles
acc = accident
mvm = million vehicle-miles
v-m = vehicle-miles
v = vehicle
P(acc) = probability of accident

*Y = acc/mile/yr

WORKSHEETS 2 AND 3: CONSEQUENCES OF A FLAMMABLE LIQUID RELEASE ON THE FOUR ALTERNATIVE ROUTES IN THE WASHINGTON, D. C. CASE STUDY

Alternative: 1

Date:

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 1 of 2

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
1-A	From I-395 and I-495	4014	3734	.47	1755	8 schools
	To Tele-graph Rd.	4036	3396	.10	340	
		4015	2689	.81	2178	
		4016	4941	.73	3607	
		4017	4274	.13	556	
	TOTAL	XXXXXXXXX	XXXXXXXX	XXXXXXXXX	8436	
1-B		4018	4127	.28	1156	3 schools
		4019	5559	.79	4392	
		2007	1749	.22	385	
	To Rte. 1	2020.02	3115	.88	2741	
		2017	1292	.11	142	
		4002	4622	.05	231	
	TOTAL	XXXXXXXX	XXXXXXXX	XXXXXXXXX	9047	
1-C	To:Indian Head Hwy.	8014.03	2944	.20	589	1 school
		8014.04	3102	.14	434	
	TOTAL	XXXXXXXXX	XXXXXXXX	XXXXXXXXX	1023	
1-D		8014.05	5139	.49	2518	6 schools
		8015	3585	.36	1291	
		8017.03	10289	.59	6071	
		8014.02	3748	.05	187	
		8017.02	2784	.93	2589	
		8017.01	5976	.05	299	
		8017.05	3742	.05	187	
		8019.02	630	.17	107-	

Alternative: 1

Date:

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 2 of 2

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
1-D (cont'd)	To Pennsylvania Avenue	8,019.01	6,453	.33	2,129	
		8,019.03	7,089	.43	3,048	
		8,019.04	4,116	.44	1,811	
		8,011.02	6,418	.07	449	
		8,021.01	5,155	.27	1,392	
	TOTAL	XXXXXXXX	XXXXXXXXXX	XXXXXXXXXXX	22,078	
1-E	To: I-495 and Rte. 50	8,022.02	9,789	.19	1,860	4 schools
		8,022.01	669	.43	288	
		ESTIMATED AREA			12,092	
		8,028.02	7,291	.12	875	
		8,035.02	1,653	.24	397	
		8,035.03	7,735	.26	2,011	
		8,036.02	4,487	.31	1,391	
		8,036.01	2,493	.44	1,097	
		8,036.08	5,597	.05	280	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXXXXX	20,291	

Alternative: 1

Date:

Page 1 of 1

WORKSHEET 3: PROPERTY INVENTORY

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

SEGMENT		LAND USE (miles fronting roadway)						NUMBER OF ROADWAY STRUCTURES		SPECIAL PROPERTIES
#	O/D	HI-DENSITY RESID.	MD-DENSITY RESID.	LOW-DENSITY RESID.	PUBLIC	COMMERCIAL	INDUSTRIAL	BRIDGE	OVERPASS	
1-A			2.1	1.7		0.5(0.4)	2.1	(3)	1	
1-B		0.1	0.8			0.3(0.1)	0.7(0.2)	(1)	(2)	Sewage Treatment Plant
1-C			0.8(0.2)			0.2(0.1)		(1)	(3)	Woodrow Wilson Bridge
1-D		(0.1)	4.5	6.4(0.3)	1.5(1.0)	0.2(0.1)		(2)	(1)	
1-E			5.0	2.3			2.0	(2)	(5)	

Note: Values in parentheses are observations made during a "drive-by" inspection and represent our best judgement as to the land-use type. The other cell entries were developed from land-use maps.

Alternative: 2

Date:

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 1 of 2

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
2-A	From I-395 and I-495	4,014	3,734	.47	1,755	8 schools
	To: Telegraph Road	4,036	3,396	.10	340	
		4,015	2,689	.81	2,178	
		4,016	4,941	.73	3,607	
		4,017	4,274	.13	556	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	8,436	
2-B	To: Rte 1	4,018	4,127	.28	1,156	3 schools
		4,019	5,559	.79	4,392	
		2,007	1,749	.22	385	
		2,020.02	3,115	.88	2,741	
		2,017	1,292	.11	142	
		4,002	4,622	.05	231	
	TOTAL	XXXXXXXXX	XXXXXXXX	XXXXXXXXXXX	9,047	
2-C	To: Indian Head Hwy.	8,014.03	2,944	.20	589	1 school
		8,014.04	3,102	.14	434	
	TOTAL	XXXXXXX	XXXXXXXX	XXXXXXXXXX	1,023	
2-D	To: I-295 & Portland Street	73.08	1,153	.61	703	
		73.07	8,211	.17	1,396	
		73.01	5,211	.67	3,491	
	TOTAL	XXXXXXXX	XXXXXXXXX	XXXXXXXXX	5,590	
2-E	To: Suitland Parkway	73.01	5,211	.28	1,459	2 schools
		73.02	5,751	.05	289	
		96	4,341	.17	738	
		74.02	12,789	.05	639	

Alternative: 2

Date:

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 2 of 2

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
2-E (cont'd)		74.01	4,538	.84	3,812	
	TOTAL	XXXXXXXX	XXXXXXXX	XXXXXXXXX	6,937	
2-F	To: Minne-sota Ave.	75.01	7,953	.38	3,022	4 schools
		76.01	7,122	.95	6,766	
		76.02	8,673	.05	434	
		77.01	6,514	1.00	6,514	
		68.03	1,471	.05	74	
		77.02	7,182	.49	3,519	
		78.02	7,786	.95	7,397	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXX	27,726	
2-G	To: B-W Parkway	78.01	7,745	.36	2,788	4 schools
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXX	2,788	
2-H	To: Land-over Ave.	8,043	4,319	.75	3,239	1 school
		8,042	4,777	.71	3,392	
		8,041.01	2,083	.78	1,635	
		8,032	3,496	.41	1,433	
	TOTAL	XXXXXXXX	XXXXXXXXX	XXXXXXXXX	9,699	
2-I	To: I-495 and Rte 50	8,041.02	5,597	.35	1,959	2 schools
		8,035.03	7,735	.17	1,315	
		8,037	3,831	.53	2,030	
		8,036.02	4,487	.50	2,244	
		8,036.03	10,406	.22	2,289	
	TOTAL	XXXXXXXX	XXXXXXXX	XXXXXXXXXX	9,837	

Alternative: 2

Date:

Page 1 of 1

WORKSHEET 3: PROPERTY INVENTORY

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

SEGMENT		LAND USE (miles fronting roadway)						NUMBER OF ROADWAY STRUCTURES		SPECIAL PROPERTIES
#	O/D	HI-DENSITY RESID.	MD-DENSITY RESID.	LOW-DENSITY RESID.	PUBLIC	COMMERCIAL	INDUSTRIAL	BRIDGE	OVERPASS	
2-A			2.1	1.7		0.5(0.4)	2.1	3	1	
2-B		0.1	0.8		(0.1)	0.3(0.1)	0.7(0.2)	1	2	Sewage Treatment Plant
2-C				0.8(0.2)		0.2(0.1)		1	3	Woodrow Wilson Bridge
2-D		0.5(0.5)	0.7(0.5)				1.0(1.0)	0	0	Sewage Treatment Plant
2-E				0.4(0.3)	0.2		1.0(0.5)	2	0	
2-F			0.2(0.2)	1.0(0.6)	0.2		0.5(0.2)	2	3	
2-G				0.5(0.2)			0.1	1	1	
2-H				0.5(0.2)			0.7(0.4)	0	4	
2-I			0.4(0.2)	0.4(0.3)		0.5	0.8(0.2)	2	1	

Note: Values in parenthesis are observations made during a "drive-by" inspection and represent our best judgement as to the land-use type. The other cell entries were developed from land-use maps.

Alternative: 3

Date: ______

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 1 of 3

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
3-A	From I-495 and I-395 To: Duke Street	4,035	6,511	.36	2,344	
		4,036	3,396	.58	1,970	
		4,055	3,314	.04	133	
		2,004	4,204	.13	547	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXXX	4,994	
3-B	To: King Street	2,001.03	5,723	.51	2,919	
		2,003.03	1,482	.62	919	
		2,001.04	3,180	.91	2,894	
		2,003.01	2,944	1.00	2,944	
		2,003.02	5,910	.32	1,891	
		2,001.05	2,146	.08	172	
		2,002	2,608	1.00	2,608	
		2,001.01	4,360	.28	1,221	
		2,001.01	2,826	.37	1,046	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXX	16,614	
	To: Washington Blvd.	1,029	6,599	.55	3,629	
		1,030	4,137	.67	2,772	
		2,010	3,497	.68	2,378	
		2,011	6,441	.05	322	
		1,038	3,716	.64	2,378	
		1,031	4,691	.32	1,501	
		1,037	2,955	.33	975	
		1,032	6,696	.47	3,147	
		1,033	1,046	.95	994	

Alternative: 3

Date: ______

Page 2 of 3

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

1 SEGMENT #	O/D	2 CENSUS TRACTS NUMBER	3 POPULATION ×	4 PERCENT OF TRACT IN IMPACT AREA =	5 POPULATION IN IMPACT AREA	6 SPECIAL POPULATIONS
3-C (cont'd)		103	4,872	.05	244	
	TOTAL	XXXXXXXX	XXXXXXXXX	XXXXXXXXXXXX	18,340	
3-D	To: 14th Street Bridge	1,035	4,181	.49	2,049	
		1,034	5,814	.22	1,279	
	TOTAL	XXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXX	3,328	
3-E	To: 11th Street Bridge	62	495	.56	277	
		61	1,112	.83	923	
		60.01	4,056	.59	2,393	
		60.02	922	1.00	922	
		65	3,689	.70	2,582	
		70	3,133	1.00	3,133	
		72	4,290	.73	3,132	
		71	4,264	.80	3,411	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXXXXX	16,773	
3-F	To: Suitland Parkway	74.01	4,538	.53	2,405	
		75.01	7,953	.30	2,386	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXX	4,791	
3-G	To: Minnesota Ave.	75.01	7,953	.38	3,022	
		76.01	7,122	.95	6,766	
		76.02	8,673	.05	434	
		77.01	6,514	1.00	6,514	
		68.03	1,471	.05	74	
		77.02	7,182	.49	3,519	
		78.02	7,786	.95	7,397	

Alternative: 3

Date:

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 3 of 3

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
3-G (cont'd)	TOTAL	XXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXXXX	27,726	
3-H	To: B-W Pway & Rte 50	78.01	7,745	.36	2,788	
	TOTAL	XXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXXX	2,788	
3-I	To: Landover Avenue	8,043	4,319	.75	3,239	
		8,042	4,777	.71	3,392	
		8,041.01	2,083	.78	1,625	
		8,032	3,496	.41	1,433	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXXX	9,689	
3-J	To: I-495 & Rte. 50	8,041	5,597	.35	1,959	
		8,035.03	7,735	.17	1,315	
		8,037	3,831	.53	2,030	
		8,036.02	4,487	.50	2,244	
		8,036.03	10,406	.22	2,289	
	TOTAL	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXX	9,837	

Alternative: 3

Date: ________

Page 1 of 1

WORKSHEET 3: PROPERTY INVENTORY

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

SEGMENT		LAND USE (miles fronting roadway)						NUMBER OF ROADWAY STRUCTURES		SPECIAL PROPERTIES
#	O/D	HI-DENSITY RESID.	MD-DENSITY RESID.	LOW-DENSITY RESID.	PUBLIC	COMMERCIAL	INDUSTRIAL	BRIDGE	OVERPASS	
3-A		.2(0.4)	1 (0.3)	.3		.5(1.1)	2(0.3)	(3)	(4)	
3-B		.3(0.3)	2.0(0.4)	(0.7)	.2	.8(0.3)		(2)	(6)	
3-C		(0.3)	1.0	1.2(0.4)	1.0	.5	(0.2)	(2)	(6)	
3-D		(0.6)			2.0	1.2(0.4)		(10)	(1)	
3-E			1.0(0.3)	(0.3)		(0.4)	(0.2)	(3)	(10)	
3-F			.5(0.2)	(0.1)	.5			(1)	(1)	
3-G			2.0(0.2)	(0.6)	.4		(0.2)	(2)	(3)	
3-H		(0.1)	(0.1)	1.5	.3			(1)	(1)	
3-I		1.0		(0.2)		1.0	(0.4)		(4)	
3-J		1.0	(0.2)	(0.3)		1.0	(0.2)	(2)	(1)	

Note: Values in parentheses are observations made during a "drive-by" inspection and represent our best judgement as to the land-use type. The other cell entries were developed from land-use maps.

Alternative: 4

Date: ____

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 1 of 3

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
4-A	From I-495 & I-395 To: Duke Street	4,035	6,511	.36	2,344	
		4,036	3,396	.58	1,970	
		4,055	3,314	.04	133	
		2,004	4,204	.13	547	
	TOTAL	XXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXX	4,994	
4-B	To: King St.	2,001.03	5,723	.51	2,919	
		2,003.03	1,482	.62	919	
		2,001.04	3,180	.91	2,894	
		2,003.01	2,944	1.00	2,944	
		2,003.02	5,910	.32	1,891	
		2,001.05	2,146	.08	172	
		2,002	2,608	1.00	2,608	
		2,001.01	4,360	.28	1,221	
		2,001.01	2,826	.37	1,046	
	TOTAL	XXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	16,614	
4-C	To: Washington Blvd.	1,029	6,599	.55	3,629	
		1,030	4,137	.67	2,772	
		2,010	3,497	.68	2,378	
		2,011	6,441	.05	322	
		1,038	3,716	.64	2,378	
		1,031	4,691	.32	1,501	
		1,037	2,955	.33	975	
		1,032	6,696	.47	3,147	
		1,033	1,046	.95	994	

Alternative: 4

Date: ______

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Page 2 of 3

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION ×	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
4-C (cont'd)		1,036	4,872	.05	244	
	TOTAL	XXXXXXXXX	XXXXXXXXXXX	XXXXXXXXXXX	18,340	
4-D	To: 14th St. Bridge	1,035	4,181	.49	2,049	
		1,034	5,814	.22	1,279	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXX	3,328	
4-E	To:New Jersey Ave. & Rte. 50	62	495	.52	257	
		61	1,112	1.00	1,112	
		60.01	4,056	1.00	4,056	
		60.02	922	.75	692	
		59	1,638	1.00	1,638	
		58	1,192	.27	322	
		47	3,701	1.00	3,701	
		48.02	2,864	1.00	2,864	
		49.02	2,527	.05	126	
		48.01	3,661	.27	988	
		46	5,830	.71	4,139	
	TOTAL	XXXXXXXXXX	XXXXXXXXX	XXXXXXXXXXX	19,895	
4-F	To: Brentwood Parkway	86	547	.54	295	
		87	7,585	.60	4,551	
		91.02	6,403	.65	4,162	
		88.01	7,224	.86	6,213	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXXX	15,221	
		91.01	4,967	.12	596	
		90	1,909	.58	1,107	

Alternative: 4

Date:

Page 3 of 3

WORKSHEET 2: POPULATION INVENTORY

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

1		2	3	4	5	6
SEGMENT		CENSUS TRACTS				SPECIAL POPULATIONS
#	O/D	NUMBER	POPULATION X	PERCENT OF TRACT IN IMPACT AREA =	POPULATION IN IMPACT AREA	
4-G	To: South Dakota Ave.	89.01	4,621	.41	1,895	
		78.01	7,745	.22	1,704	
	TOTAL	XXXXXXXXX	XXXXXXXX	XXXXXXXXXXX	15,677	
4-H	To: B-W Parkway	8,043	4,319	.25	1,080	
	TOTAL	XXXXXXXXXX	XXXXXXXXX	XXXXXXXXXXXX	1,080	
4-I	To: Landover Ave.	8,043	4,319	.75	3,239	
		8,042	4,777	.71	3,392	
		8,041.01	2,083	.78	1,625	
		8,032	3,496	.41	1,433	
	TOTAL	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXXX	9,689	
4-J	To: I-495 & Rte. 50	8,041.02	5,597	.35	1,959	
		8,035.03	7,735	.17	1,315	
		8,037	3,831	.53	2,030	
		8,036.02	4,487	.50	2,244	
		8,036.03	10,406	.22	2,289	
	TOTAL	XXXXXXXX	XXXXXXXXX	XXXXXXXXXXXXX	9,837	

Alternative: 4

Date:

Page 1 of 1

WORKSHEET 3: PROPERTY INVENTORY

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

SEGMENT		LAND USE (miles fronting roadway)						NUMBER OF ROADWAY STRUCTURES		SPECIAL PROPERTIES
#	O/D	HI-DENSITY RESID.	MD-DENSITY RESID.	LOW-DENSITY RESID.	PUBLIC	COMMERCIAL	INDUSTRIAL	BRIDGE	OVERPASS	
4-A		.2 (0.4)	1 (0.3)	.3		.5(1.1)	2 (0.3)	(3)	(4)	
4-B		.3 (0.3)	2.0 (0.4)	(0.7)	.2	.8 (0.3)		(2)	(6)	
4-C		(0.3)	1.0	1.2 (0.4)	1.0	.5	(0.2)	(2)	(6)	
4-D		(0.6)			2.0	1.2(0.4)		(10)	(1)	Pentagon
4-E		(.2)	.4 (.1)		1.0 (.4)	.5 (.3)		(2)	(12)	
4-F			.8 (.4)	(.2)			1.0(.6)	(0)	(0)	
4-G			(.2)		.5 (.2)		2.0(1.5)	(2)	(2)	
4-H		(.1)		(.4)	.5 (.2)			(2)	(1)	
4-I		1.0		(0.2)		1.0	(0.4)		(4)	
4-J		1.0	(0.2)	(0.3)		1.0	(0.2)	(2)	(1)	

Note: Values in parenthesis are observations made during a "drive-by" inspection and represent our best judgement as to the land-use type. The other cell entries were developed from land-use maps.

APPENDIX F

CONTROL MEDIUMS FOR SELECTED HAZARDOUS MATERIALS FIRES

TABLE 31

MEDIUM USED TO CONTROL COMMODITIES MOST FREQUENTLY INVOLVED IN ACCIDENTS

Commodity	Small* Fire	Large* Fire
Acetylene	4	1
Ethylene	4	1
Hydrogen Gas	4	1
Hydrogen Liquid	4	1
Liq Petroleum Gas	4	1
Trimethylamine	4	1
Comp Tree & Weed Killer	4	1
Sodium Cyanide	5	1

Dinotrophenol Sol	5	1
Insecticide Dry or Liquid	2	2
Methyl Bromide	5	1
Organic Phosphate	5	1
Poisonous Liquid	5	1
Poisonous Solution	5	1
Fissile RAM		
RAM low		
RAM N.O.S.		
Ammo Cannon Explo	6	6
Blasting Caps 1,000	6	6
Booster Explosives	6	6
Explosive Bomb	6	6
Explosive Class A	6	6
Explosive Class B	6	6
Explosive Class C	6	6

Acid Liq N.O.S	5	1
Alka Caust Liq N.O.S	5	1
Battery Stor Wet	5	1
Caustic Soda Liq	5	1
Comp Cleaning Liq C	5	1
Corrosive N.O.S	5	1
Elect Batt Fluid	4	1
Hydrochloric Acid	5	1
Nitric Acid	7	3
Sodium Hydroxide Liq	5	1
Sulfuric Acid	4	3
Asphalt Cutback	4	3
Combus Liq N.O.S.	5	1
Fuel Oil	5	1
Kerosene	5	1

Flammable Solid N.O.S.	9	1	Oil Petrol N.O.S.	5	1
Phosphorous Pentasul	10	1	Petrol Distill CL	5	1
			Solvent N.O.S. CL	5	1
			Acetone	5	1
Smokeless Powder	9	1			
Sodium Hydrosulfite	10	3			
Ammonium Nitrate	5	1	Alcohol N.O.S.	5	1
			Cement Liq N.O.S.	5	1
Ammonium w Fert	5	1	Comp Paint Remover	5	1
Ammonium with Mix Fert	5	1	Crude Oil Petrol	5	1
Ca Hypochlorite Mix	5	1	Flam Liq N.O.S.	5	1
Chromic Acid	5	1	Fuel Aviation Turbn	5	1
			Gasoline	8	1
Nitro Carbo-Nitrate					
Oxy Mat N.O.S	5	1	Motor fuel N.O.S.	8	1
Argon Press Liq	N/A	N/A	Oil N.O.S.	5	1
CO_2 Liquified	N/A	N/A	Paint, enamel, Laq, Stain	5	1
Comp Gass N.O.S.	Unk	Unk			

SOURCES

* Johns Hopkins University, Hazardous Materials Emergency Response Guide - Draft, Washington, D.C., September 1979

KEY

1 = H_2O spray, fog or foam

2 = H_2O spray

3 = Flood with water

4 = Dry chemical/CO_2

5 = Dry chemical/CO_2, H_2O spray, foam

6 = Flood with water or use dry chemical or dirt - Caution fire may start again

7 = Water, dry chemical or soda ash

8 = Dry chemical CO_2, foam

9 = Dry chemical, sand, H_2O spray, foam

10 = Dry chemical, soda ash, lime

11 = Water blanket, dry chemical CO_2

TABLE 32

MEDIUM USED TO CONTROL THOSE COMMODITIES
DEEMED MOST HAZARDOUS IN REVISED EMERGENCY RESPONSE GUIDE 9/79

Commodity	Small* Fire	Large* Fire
Acrolein	5	1
Acrylonitrite	5	1
Anhydrous Ammonia	4	1
Ammonia Sol over 40%	4	1
Boron Trifluoride	4	1
Bromine	5	1
Carbon Liq Disulfide	5	1

Chlorine	4	1	Fluorine Liquid	10	1
Dimethylamine	5	1	Hydrochlorine	4	1
Dimethyl Sulfate	11	1	Hydrogen Chloride	Unk	Unk
			Hydrogen Sulfide	4	1
Epichlorahydrin Liq	5	1			
Ethyleneimere	5	1	Methylamine Anhydrous	4	1
			Methyl Bromide	5	1
Ethylene Oxide	4	1			

Methyl Chloride	4	1
Nitrogen Tetroxide	N/A	N/A
Sulfur Dioxide	N/A	N/A
Sulfuric Acid (Fuming)	4	6

* H.M. Emergency Response Guide, Johns Hopkins University, Applied Physics Lab, Draft, September 1979, Laurel, Maryland

APPENDIX G

WORKSHEET 4: POPULATION RISK CALCULATIONS FOR THE FOUR ALTERNATIVE ROUTES IN THE WASHINGTON, D. C., CASE STUDY

Alternative: 1

Date: __________

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WORKSHEET 4: POPULATION RISK CALCULATIONS

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

1 SEGMENT	2 P(ANY VEHICLE ACC.) ×	3 H.M. ACCIDENT INCIDENCE FACTOR =	4 P(H.M. VEH. ACC.) ×	5 SEGMENT POPULATION =	6 SEGMENT POPULATION RISK
1-A	7.680×10^{-6}	2.3×10^{-5}	1.766×10^{-10}	8436	1.490×10^{-6}
1-B	1.971×10^{-6}	"	4.533×10^{-11}	9047	4.101×10^{-7}
1-C	4.986×10^{-6}	"	1.147×10^{-10}	1023	1.173×10^{-7}
1-D	9.185×10^{-6}	"	2.113×10^{-10}	22078	4.664×10^{-6}
1-E	12.084×10^{-6}	"	2.779×10^{-10}	20291	5.640×10^{-6}
		"		TOTAL	1.232×10^{-5}
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		2.3×10^{-5}			

Alternative: 2

Date:

Page 1 of 1

WORKSHEET 4: POPULATION RISK CALCULATIONS

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

1 SEGMENT	2 P(ANY VEHICLE ACC.) ×	3 H.M. ACCIDENT INCIDENCE FACTOR =	4 P(H.M. VEH. ACC.) ×	5 SEGMENT POPULATION =	6 SEGMENT POPULATION RISK
2-A	7.680×10^{-6}	2.3×10^{-5}	1.766×10^{-10}	8436	1.490×10^{-6}
2-B	1.971×10^{-6}	"	4.533×10^{-11}	9047	4.101×10^{-7}
2-C	4.986×10^{-6}	"	1.147×10^{-10}	1023	1.173×10^{-7}
2-D	5.146×10^{-6}	"	1.184×10^{-10}	5590	6.619×10^{-7}
2-E	3.798×10^{-6}	"	8.735×10^{-11}	6937	6.060×10^{-7}
2-F	9.204×10^{-6}	"	2.117×10^{-10}	27726	5.870×10^{-6}
2-G	2.808×10^{-6}	"	6.458×10^{-11}	2788	1.801×10^{-7}
2-H	7.889×10^{-6}	"	1.815×10^{-10}	9699	1.760×10^{-6}
2-I	8.892×10^{-6}	"	2.045×10^{-10}	9837	2.021×10^{-6}
		"		TOTAL	1.311×10^{-5}
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		2.3×10^{-5}			

Alternative: 3

Date: ______

Page 1 of 1

WORKSHEET 4: POPULATION RISK CALCULATIONS

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

1	2		3		4		5		6
SEGMENT	P(ANY VEHICLE ACC.)	X	H.M. ACCIDENT INCIDENCE FACTOR	=	P(H.M. VEH. ACC.)	X	SEGMENT POPULATION	=	SEGMENT POPULATION RISK
3-A	4.773×10^{-6}		2.3×10^{-5}		1.098×10^{-10}		4994		5.482×10^{-7}
3-B	5.385×10^{-6}		"		1.239×10^{-10}		16614		2.059×10^{-6}
3-C	5.493×10^{-6}		"		1.263×10^{-10}		18340		2.317×10^{-6}
3-D	3.996×10^{-6}		"		9.191×10^{-11}		3328		3.059×10^{-7}
3-E	6.204×10^{-6}		"		1.427×10^{-10}		16773		2.394×10^{-6}
3-F	1.984×10^{-6}		"		4.563×10^{-11}		4791		2.186×10^{-7}
3-G	9.204×10^{-6}		"		2.117×10^{-10}		27726		5.870×10^{-6}
3-H	2.808×10^{-6}		"		6.458×10^{-11}		2788		1.801×10^{-7}
3-I	7.889×10^{-6}		"		1.815×10^{-10}		9689		1.760×10^{-6}
3-J	8.892×10^{-6}		"		2.045×10^{-10}		9837		2.012×10^{-6}
			"				TOTAL		1.767×10^{-5}
			"						
			"						
			"						
			"						
			"						
			"						
			"						
			"						
			"						
			"						
			"						
			"						
			"						
			2.3×10^{-5}						

Alternative: 4

Date:

Page 1 of 1

WORKSHEET 4: POPULATION RISK CALCULATIONS

H.M. Class: Flammable Liquid

Impact Radius: .5 mile

1 SEGMENT	2 P(ANY VEHICLE ACC.) ×	3 H.M. ACCIDENT INCIDENCE FACTOR =	4 P(H.M. VEH. ACC.) ×	5 SEGMENT POPULATION =	6 SEGMENT POPULATION RISK
4-A	4.773×10^{-6}	2.3×10^{-5}	1.098×10^{-10}	4994	5.482×10^{-7}
4-B	5.385×10^{-6}	"	1.239×10^{-10}	16614	2.058×10^{-6}
4-C	5.493×10^{-6}	"	1.263×10^{-10}	18340	2.317×10^{-6}
4-D	3.996×10^{-6}	"	9.191×10^{-11}	3328	3.059×10^{-7}
4-E	5.724×10^{-6}	"	1.317×10^{-10}	19895	2.619×10^{-6}
4-F	7.812×10^{-6}	"	1.797×10^{-10}	15221	2.735×10^{-6}
4-G	10.604×10^{-6}	"	2.439×10^{-10}	15667	3.821×10^{-6}
4-H	3.773×10^{-6}	"	8.678×10^{-11}	2980	2.586×10^{-7}
4-I	7.889×10^{-6}	"	1.815×10^{-10}	9689	1.759×10^{-6}
4-J	8.892×10^{-6}	"	2.045×10^{-10}	9837	2.012×10^{-6}
		"		TOTAL	1.843×10^{-5}
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		"			
		2.3×10^{-5}			

APPENDIX H

STATISTICAL DESCRIPTORS FOR PREDICTIVE EQUATIONS

INTERSTATE MODEL (27)

ROADWAY TYPE	CORRELATION COEFFICIENT (Accident Rate vs. AADT)	CONFIDENCE LEVEL FOR POPULATION r(ρ)* (%)
Rural/Suburban		
4 - Lane	.210	99
6 - Lane	.467	99
8 - Lane	.552	99
Urban		
4 - Lane	.381	99
6 - Lane	.300	99
8 - Lane	.296	99
10 - Lane	.591	99

* Level of confidence at which ρ is (statistically) significantly different from zero.

Figure H-1 on the following page presents plots for the regression equations.

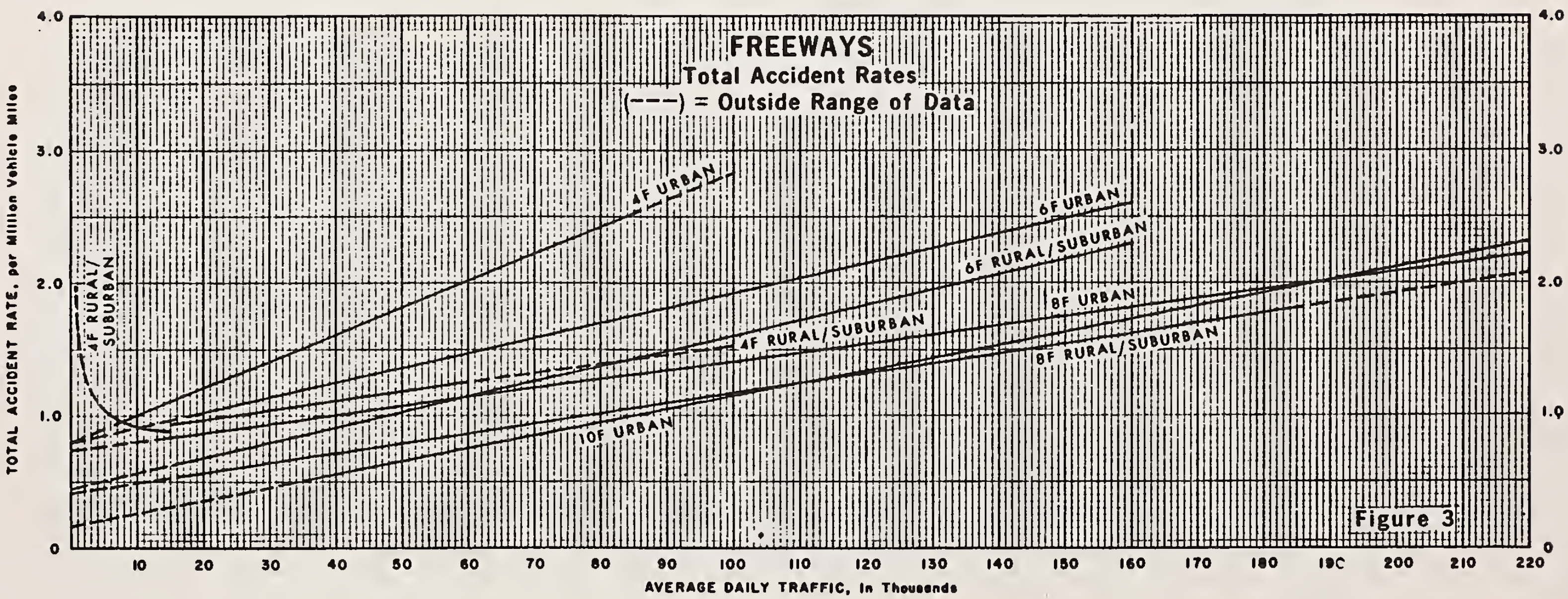

FIGURE H-1: TOTAL ACCIDENT RATES ON FREEWAYS

URBAN ARTERIALS (30)

One hundred sections of urban arterials, which varied in length from 0.254 to 4.167 miles, were used to calibrate the regression model. The study sections were located in Lafayette and Indianapolis, Indiana. Most of the study sections were urban extensions of state highways because of the availability of volume and accident data for them.

In two separate analyses, two different dependent variables were regressed against the independent variables of volume (AADT), the number of heavy volume intersections per mile, and the number of traffic signals per mile. The first dependent variable, number of accidents per 100 million vehicle-miles, failed to produce an equation that could explain more than 50 percent of the variability in accident rates on these sections. Regressing the independent variable against the accident rate also produced illogical and contradictory results.

The regression equation for annual accidents per mile, on the other hand, explained 74 percent of the variability in the number of accidents on the study sections ($R^2 = .74$). In addition, the signs of the coefficients are positive and support the notion that more traffic interactions (e.g., intersections) result in more accidents.

2 - LANE CONVENTIONAL RURAL HIGHWAYS (27)

Equation	MVM In Sample	Number of Segments	Standard Error of Estimate for the Regression	Correlation Coefficient (Accident Rates vs. AADT)	Confidence Level* for Population r(ρ)
$Y=1.87+0.65/x$ **	901	41	.94	.372	98%

* Level of confidence at which ρ is (statistically) significantly different from zero.

** Equation for a rolling, 2 - Lane Rural Highway with speeds > 55 mph.

Figure H-2 on the following page presents plots for the regression equations.

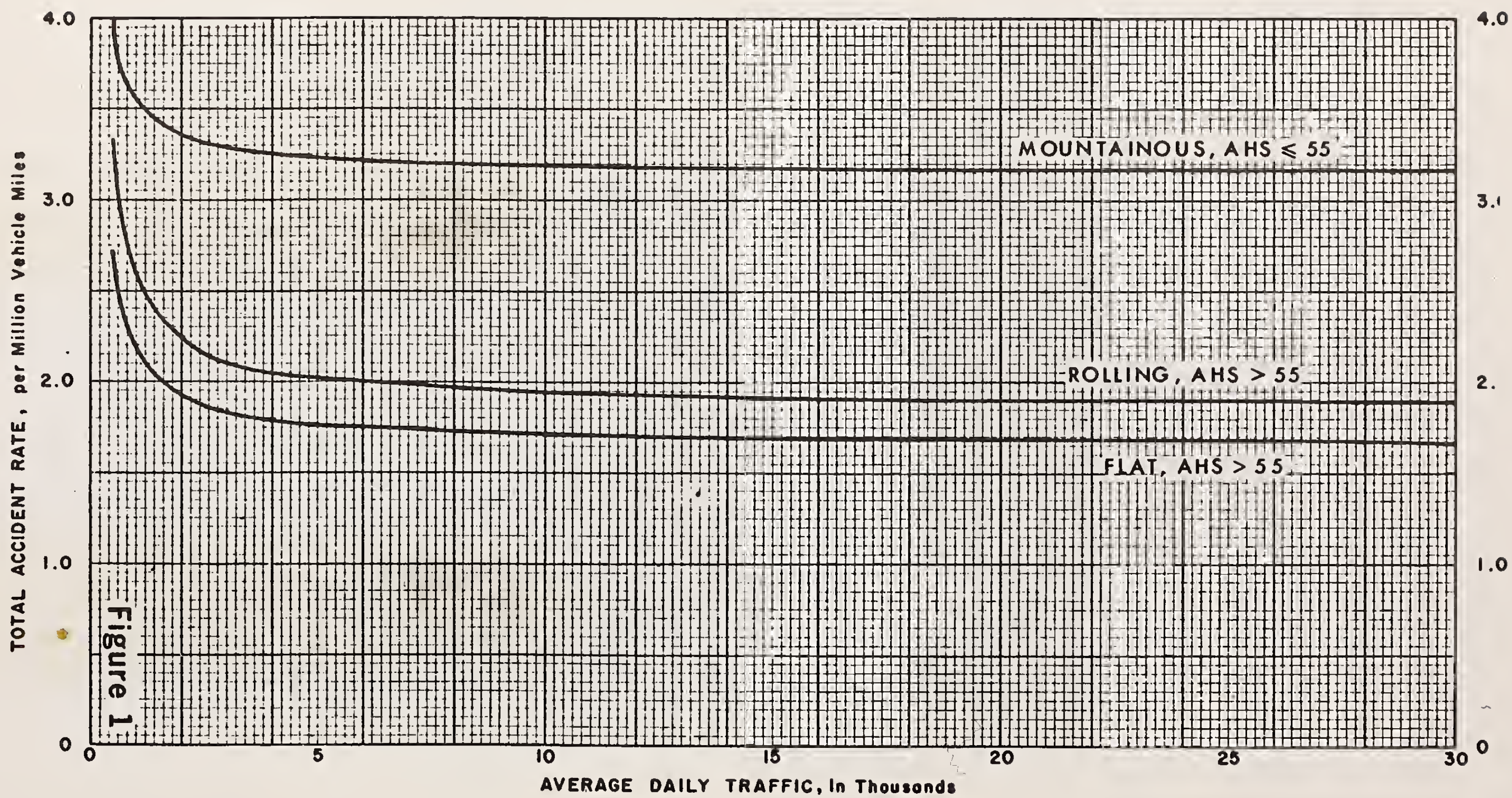

FIGURE H-2: TOTAL ACCIDENT RATES ON 2-LANE CONVENTIONAL RURAL HIGHWAYS

Source: (27)

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FEDERALLY COORDINATED PROGRAM (FCP) OF HIGHWAY RESEARCH AND DEVELOPMENT

The Offices of Research and Development (R&D) of the Federal Highway Administration (FHWA) are responsible for a broad program of staff and contract research and development and a Federal-aid program, conducted by or through the State highway transportation agencies, that includes the Highway Planning and Research (HP&R) program and the National Cooperative Highway Research Program (NCHRP) managed by the Transportation Research Board. The FCP is a carefully selected group of projects that uses research and development resources to obtain timely solutions to urgent national highway engineering problems.*

The diagonal double stripe on the cover of this report represents a highway and is color-coded to identify the FCP category that the report falls under. A red stripe is used for category 1, dark blue for category 2, light blue for category 3, brown for category 4, gray for category 5, green for categories 6 and 7, and an orange stripe identifies category 0.

FCP Category Descriptions

1. Improved Highway Design and Operation for Safety

Safety R&D addresses problems associated with the responsibilities of the FHWA under the Highway Safety Act and includes investigation of appropriate design standards, roadside hardware, signing, and physical and scientific data for the formulation of improved safety regulations.

2. Reduction of Traffic Congestion, and Improved Operational Efficiency

Traffic R&D is concerned with increasing the operational efficiency of existing highways by advancing technology, by improving designs for existing as well as new facilities, and by balancing the demand-capacity relationship through traffic management techniques such as bus and carpool preferential treatment, motorist information, and rerouting of traffic.

3. Environmental Considerations in Highway Design, Location, Construction, and Operation

Environmental R&D is directed toward identifying and evaluating highway elements that affect the quality of the human environment. The goals are reduction of adverse highway and traffic impacts, and protection and enhancement of the environment.

4. Improved Materials Utilization and Durability

Materials R&D is concerned with expanding the knowledge and technology of materials properties, using available natural materials, improving structural foundation materials, recycling highway materials, converting industrial wastes into useful highway products, developing extender or substitute materials for those in short supply, and developing more rapid and reliable testing procedures. The goals are lower highway construction costs and extended maintenance-free operation.

5. Improved Design to Reduce Costs, Extend Life Expectancy, and Insure Structural Safety

Structural R&D is concerned with furthering the latest technological advances in structural and hydraulic designs, fabrication processes, and construction techniques to provide safe, efficient highways at reasonable costs.

6. Improved Technology for Highway Construction

This category is concerned with the research, development, and implementation of highway construction technology to increase productivity, reduce energy consumption, conserve dwindling resources, and reduce costs while improving the quality and methods of construction.

7. Improved Technology for Highway Maintenance

This category addresses problems in preserving the Nation's highways and includes activities in physical maintenance, traffic services, management, and equipment. The goal is to maximize operational efficiency and safety to the traveling public while conserving resources.

0. Other New Studies

This category, not included in the seven-volume official statement of the FCP, is concerned with HP&R and NCHRP studies not specifically related to FCP projects. These studies involve R&D support of other FHWA program office research.

* The complete seven-volume official statement of the FCP is available from the National Technical Information Service, Springfield, Va. 22161. Single copies of the introductory volume are available without charge from Program Analysis (HRD-3), Offices of Research and Development, Federal Highway Administration, Washington, D.C. 20590.